Laboratory Report for

Brown and Caldwell

Samples: OU4-LEP-1,3,5,7,8

Project: #136259, OU4-Phase I

January 20, 2009

Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109

January 20, 2009

Ms. Penny Bassett
Brown and Caldwell
3264 Goni Road Suite 153
Carson City, NV 89706
(775) 883-4118

Re: DBS&A Laboratory Report for Brown and Caldwell (Project: OU4-Phase I 136259)

Dear Ms. Bassett

Enclosed is the final report for the Brown and Caldwell (Project: OU4-Phase I 136259) samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed final report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the final report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to Brown and Caldwell and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
LABORATORY / TESTING FACILITY

Ryan Marshall
Assistant Laboratory Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
6020 Academy Rd., NE, Suite 100 505-822-9400
Albuquerque, NM 87109-3315 FAX 505-822-8877

Summaries

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties[1]		Saturated Hydraulic Conductivity[2]			Moisture Characteristics[3]								Particle Size[4]			Specific Gravity[5]		Air Perm-eability	Atterberg Limits	Proctor Compaction
	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K_{unsat}	DS	WS	H	F	C			
OU4-LEP-01A-SG	X			X		X	X		X	X			X		X	X				X	
OU4-LEP-01B-SG	X			X		X	X		X	X			X		X	X				X	
OU4-LEP-03A-SG	X			X		X	X		X	X			X		X	X				X	
OU4-LEP-03B-SG	X			X		X	X		X	X			X		X	X				X	
OU4-LEP-05A-SG	X			X		X	X		X	X			X		X	X				X	
OU4-LEP-05B-SG	X			X		X	X		X	X			X		X	X				X	
OU4-UEP-07A-SG	X		X			X	X		X	X			X		X	X				X	
OU4-UEP-07B-SG	X			X		X	X		X	X			X		X	X				X	
OU4-UEP-08A-SG	X		X			X	X		X	X			X		X	X				X	
OU4-UEP-08B-SG	X		X			X	X		X	X			X		X	X				X	

[1] VM = Volume Measurement Method, VD = Volume Displacement Method

[2] CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

[3] HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, Kunsat = Calculated Unsaturated Hydraulic Conductivity

[4] DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

[5] F = Fine (<4.75mm), C = Coarse (>4.75mm)

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Moisture Content				Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)			
OU4-LEP-01A-SG	25.6	42.8	---	---	1.67	2.10	36.9
OU4-LEP-01B-SG	21.7	35.9	---	---	1.65	2.01	37.6
OU4-LEP-03A-SG	32.8	49.4	---	---	1.51	2.00	43.1
OU4-LEP-03B-SG	18.2	30.2	---	---	1.66	1.96	37.3
OU4-LEP-05A-SG	25.3	39.7	---	---	1.56	1.96	40.9
OU4-LEP-05B-SG	29.1	43.1	---	---	1.48	1.92	44.0
OU4-UEP-07A-SG	14.1	21.1	---	---	1.49	1.70	43.8
OU4-UEP-07B-SG	23.0	36.4	---	---	1.58	1.95	40.3
OU4-UEP-08A-SG	2.2	3.7	---	---	1.66	1.69	37.5
OU4-UEP-08B-SG	13.1	21.4	---	---	1.63	1.85	38.4

NA = Not analyzed

--- = This sample was not remolded

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversize Corrected K_{sat} (cm/sec)	Method of Analysis	
			Constant Head	Falling Head
OU4-LEP-01A-SG	3.9E-07	NA		X
OU4-LEP-01B-SG	6.8E-07	NA		X
OU4-LEP-03A-SG	≤8.5E-10*	NA		X
OU4-LEP-03B-SG	1.5E-07	NA		X
OU4-LEP-05A-SG	≤2.8E-08*	NA		X
OU4-LEP-05B-SG	≤1.1E-08*	NA		X
OU4-UEP-07A-SG	5.5E-04	NA	X	
OU4-UEP-07B-SG	6.5E-08	NA		X
OU4-UEP-08A-SG	4.9E-03	NA	X	
OU4-UEP-08B-SG	1.6E-04	NA	X	

* Outflow was not detected after seventeen days of testing, even though sample was saturated. Results above are based on flow into sample. Reported conductivity is at the limit of the testing apparatus; the result is less than or equal to the reported conductivity.

Summary of Moisture Characteristics of the Initial Drainage Curve

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-LEP-01A-SG	0	36.5
	63	35.5
	205	34.4
	357	33.3
	1428	30.8
	45483	6.8
	311039	3.0
	851293	2.1
OU4-LEP-01B-SG	0	40.4
	51	36.9
	510	33.0
	1530	29.2
	68531	8.4
	400781	5.3
	851293	3.2
OU4-LEP-03A-SG	0	46.4 ⌗
	51	46.1 ⌗
	149	46.6 ⌗
	337	43.7 ⌗
	1479	43.2 ⌗
	203960	15.9 ⌗
	851293	7.4 ⌗
OU4-LEP-03B-SG	0	41.9
	51	39.6
	612	32.9
	1530	32.2
	79340	12.3
	184584	9.5
	851293	3.9

⌗ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-LEP-05A-SG	0	43.5 ⌗
	52	44.8 ⌗
	155	44.9 ⌗
	337	43.1 ⌗
	1479	43.3 ⌗
	283504	8.4 ⌗
	851293	5.2 ⌗
OU4-LEP-05B-SG	0	46.9
	55	46.5 ⌗
	154	46.4 ⌗
	337	44.7 ⌗
	1479	44.2 ⌗
	74751	15.1 ⌗
	249851	9.8 ⌗
	851293	4.4 ⌗
OU4-UEP-07A-SG	0	46.5
	17	35.3
	31	29.2
	105	21.7
	510	18.6
	74037	7.8
	219257	6.5
	851293	3.0
OU4-UEP-07B-SG	0	43.5
	51	39.2
	612	36.1
	1530	34.9
	24271	17.6
	130534	10.8
	851293	6.0

⌗ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-UEP-08A-SG	0	36.4 ⌗
	5	33.0 ⌗
	20	14.4 ⌗
	46	6.7 ⌗
	82	6.3 ⌗
	520	5.5 ⌗
	103000	2.1 ⌗
	851293	1.3 ⌗
OU4-UEP-08B-SG	0	43.0
	25	40.8
	64	28.8
	123	21.3
	510	17.2
	276366	4.6
	851293	3.3

⌗ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Calculated Unsaturated Hydraulic Properties

Sample Number	α (cm^{-1})	N (dimensionless)	θ_r (% vol)	θ_s (% vol)	Oversize Corrected θ_r (% vol)	Oversize Corrected θ_s (% vol)
OU4-LEP-01A-SG	0.0005	1.5134	0.00	35.33	NA	NA
OU4-LEP-01B-SG	0.0013	1.3300	0.00	38.52	NA	NA
OU4-LEP-03A-SG	0.0002	1.3321	0.00	45.57	NA	NA
OU4-LEP-03B-SG	0.0015	1.2650	0.00	40.57	NA	NA
OU4-LEP-05A-SG	0.0001	1.4674	0.00	44.16	NA	NA
OU4-LEP-05B-SG	0.0002	1.4282	0.00	46.21	NA	NA
OU4-UEP-07A-SG	0.2495	1.2138	1.29	46.57	NA	NA
OU4-UEP-07B-SG	0.0009	1.2814	0.00	41.07	NA	NA
OU4-UEP-08A-SG	0.1093	2.2461	2.99	36.64	NA	NA
OU4-UEP-08B-SG	0.0316	1.4777	3.86	44.15	NA	NA

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed

Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification	
OU4-LEP-01A-SG	0.087	0.29	0.41	4.7	0.81	WS/H	Poorly-graded sand with silt (SP-SM)	Sand	
OU4-LEP-01B-SG	0.041	0.36	0.47	11	2.5	WS/H	Well-graded sand with silt (SW-SM)	Loamy Sand †	
OU4-LEP-03A-SG	0.00017	0.0063	0.0093	55	1.2	WS/H	Lean clay (CL)	Silty Clay Loam	(Est)
OU4-LEP-03B-SG	0.0017	0.021	0.028	16	2.5	WS/H	Silty clay (CL-ML)	Silt Loam	
OU4-LEP-05A-SG	0.00016	0.0024	0.0036	23	0.67	WS/H	Fat clay (CH)	Silty Clay	(Est)
OU4-LEP-05B-SG	0.0011	0.13	0.17	155	11	WS/H	Clayey sand (SC)	Sandy Loam	(Est)
OU4-UEP-07A-SG	0.048	0.59	0.95	20	0.97	WS/H	Silty sand (SM)	Loamy Sand †	
OU4-UEP-07B-SG	0.00045	0.15	0.21	467	16	WS/H	Clayey sand (SC)	Sandy Loam	(Est)
OU4-UEP-08A-SG	0.088	0.71	1.0	11	1.1	WS/H	Well-graded sand with silt (SW-SM)	Sand †	
OU4-UEP-08B-SG	0.00076	0.043	0.065	86	8.9	WS/H	Sandy silt s(ML)	Loam	(Est)

d_{50} = Median particle diameter

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
OU4-LEP-01A-SG	---	---	---	ML
OU4-LEP-01B-SG	---	---	---	ML
OU4-LEP-03A-SG	49	21	28	CL
OU4-LEP-03B-SG	25	20	5	CL-ML
OU4-LEP-05A-SG	81	23	58	CH
OU4-LEP-05B-SG	48	19	29	CL
OU4-UEP-07A-SG	---	---	---	ML
OU4-UEP-07B-SG	35	17	18	CL
OU4-UEP-08A-SG	---	---	---	ML
OU4-UEP-08B-SG	36	26	10	ML

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory Data and Graphical Plots

Initial Properties

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Moisture Content				Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)			
OU4-LEP-01A-SG	25.6	42.8	---	---	1.67	2.10	36.9
OU4-LEP-01B-SG	21.7	35.9	---	---	1.65	2.01	37.6
OU4-LEP-03A-SG	32.8	49.4	---	---	1.51	2.00	43.1
OU4-LEP-03B-SG	18.2	30.2	---	---	1.66	1.96	37.3
OU4-LEP-05A-SG	25.3	39.7	---	---	1.56	1.96	40.9
OU4-LEP-05B-SG	29.1	43.1	---	---	1.48	1.92	44.0
OU4-UEP-07A-SG	14.1	21.1	---	---	1.49	1.70	43.8
OU4-UEP-07B-SG	23.0	36.4	---	---	1.58	1.95	40.3
OU4-UEP-08A-SG	2.2	3.7	---	---	1.66	1.69	37.5
OU4-UEP-08B-SG	13.1	21.4	---	---	1.63	1.85	38.4

NA = Not analyzed

--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	130.32	
Tare weight, ring (g):	31.80	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	78.43	
Sample volume (cm^3):	46.89	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	25.6	
Volumetric Moisture Content (% vol):	42.8	
Dry bulk density (g/cm^3):	1.67	
Wet bulk density (g/cm^3):	2.10	
Calculated Porosity (% vol):	36.9	
Percent Saturation:	116.2	

Laboratory analysis by: A. Barraza
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	122.40	
Tare weight, ring (g):	31.32	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	74.81	
Sample volume (cm^3):	45.26	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	21.7	
Volumetric Moisture Content (% vol):	35.9	
Dry bulk density (g/cm^3):	1.65	
Wet bulk density (g/cm^3):	2.01	
Calculated Porosity (% vol):	37.6	
Percent Saturation:	95.5	

Laboratory analysis by: A. Barraza
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	121.28	
Tare weight, ring (g):	34.65	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	65.25	
Sample volume (cm^3):	43.27	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	32.8	
Volumetric Moisture Content (% vol):	49.4	
Dry bulk density (g/cm^3):	1.51	
Wet bulk density (g/cm^3):	2.00	
Calculated Porosity (% vol):	43.1	
Percent Saturation:	114.6	

Laboratory analysis by: A. Barraza
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	108.40	
Tare weight, ring (g):	27.63	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	68.33	
Sample volume (cm^3):	41.14	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	18.2	
Volumetric Moisture Content (% vol):	30.2	
Dry bulk density (g/cm^3):	1.66	
Wet bulk density (g/cm^3):	1.96	
Calculated Porosity (% vol):	37.3	
Percent Saturation:	81.0	

Laboratory analysis by: A. Barraza
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	132.41	
Tare weight, ring (g):	37.85	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	75.44	
Sample volume (cm^3):	48.21	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	25.3	
Volumetric Moisture Content (% vol):	39.7	
Dry bulk density (g/cm^3):	1.56	
Wet bulk density (g/cm^3):	1.96	
Calculated Porosity (% vol):	40.9	
Percent Saturation:	96.9	

Laboratory analysis by: A. Barraza
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	118.30	
Tare weight, ring (g):	31.10	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	67.56	
Sample volume (cm^3):	45.53	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	29.1	
Volumetric Moisture Content (% vol):	43.1	
Dry bulk density (g/cm^3):	1.48	
Wet bulk density (g/cm^3):	1.92	
Calculated Porosity (% vol):	44.0	
Percent Saturation:	98.0	

Laboratory analysis by: A. Barraza
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	112.83	
Tare weight, ring (g):	36.18	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	67.16	
Sample volume (cm^3):	45.07	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	14.1	
Volumetric Moisture Content (% vol):	21.1	
Dry bulk density (g/cm^3):	1.49	
Wet bulk density (g/cm^3):	1.70	
Calculated Porosity (% vol):	43.8	
Percent Saturation:	48.1	

Laboratory analysis by: A. Barraza
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	129.76	
Tare weight, ring (g):	33.89	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	77.92	
Sample volume (cm^3):	49.25	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	23.0	
Volumetric Moisture Content (% vol):	36.4	
Dry bulk density (g/cm^3):	1.58	
Wet bulk density (g/cm^3):	1.95	
Calculated Porosity (% vol):	40.3	
Percent Saturation:	90.4	

Laboratory analysis by: A. Barraza
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	107.78	
Tare weight, ring (g):	30.87	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	75.22	
Sample volume (cm^3):	45.40	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	2.2	
Volumetric Moisture Content (% vol):	3.7	
Dry bulk density (g/cm^3):	1.66	
Wet bulk density (g/cm^3):	1.69	
Calculated Porosity (% vol):	37.5	
Percent Saturation:	9.9	

Laboratory analysis by: A. Barraza
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	20-Oct-08	---
Field weight of sample* (g):	127.19	
Tare weight, ring (g):	38.73	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	78.20	
Sample volume (cm^3):	47.92	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	13.1	
Volumetric Moisture Content (% vol):	21.4	
Dry bulk density (g/cm^3):	1.63	
Wet bulk density (g/cm^3):	1.85	
Calculated Porosity (% vol):	38.4	
Percent Saturation:	55.7	

Laboratory analysis by: A. Barraza
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Saturated Hydraulic Conductivity

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversize Corrected K_{sat} (cm/sec)	Method of Analysis	
			Constant Head	Falling Head
OU4-LEP-01A-SG	3.9E-07	NA		X
OU4-LEP-01B-SG	6.8E-07	NA		X
OU4-LEP-03A-SG	≤8.5E-10*	NA		X
OU4-LEP-03B-SG	1.5E-07	NA		X
OU4-LEP-05A-SG	≤2.8E-08*	NA		X
OU4-LEP-05B-SG	≤1.1E-08*	NA		X
OU4-UEP-07A-SG	5.5E-04	NA	X	
OU4-UEP-07B-SG	6.5E-08	NA		X
OU4-UEP-08A-SG	4.9E-03	NA	X	
OU4-UEP-08B-SG	1.6E-04	NA	X	

* Outflow was not detected after seventeen days of testing, even though sample was saturated. Results above are based on flow into sample. Reported conductivity is at the limit of the testing apparatus; the result is less than or equal to the reported conductivity.

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-LEP-01A-SG
Project Name: OU4-Phase I
Project Number: 136259

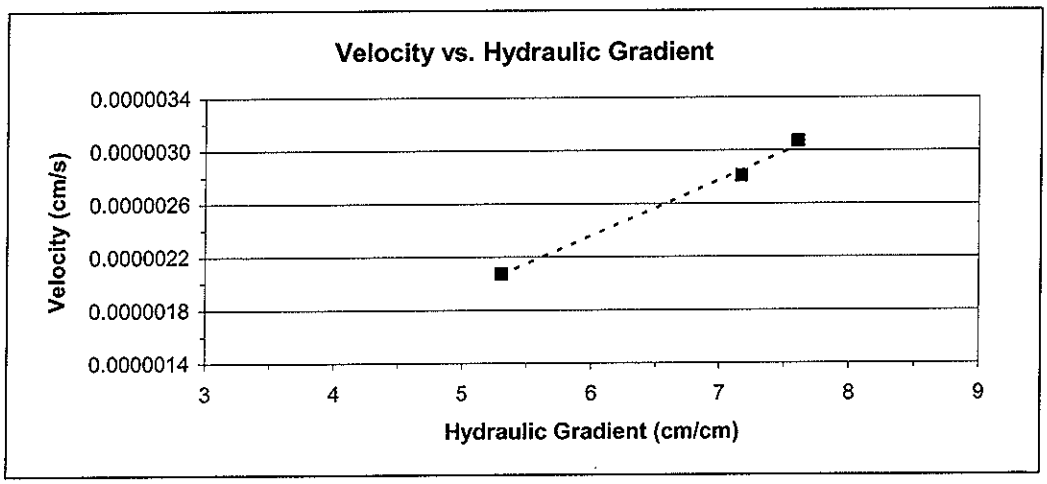
Type of water used: TAP
Backpressure (psi): 0.0
Offset (cm): 3.1
Sample length (cm): 4.38
Sample x-sectional area (cm^2): 10.72
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
29-Oct-08	16:41:08	21.6	37.8	34.7	58440	4.0E-07	4.0E-07
30-Oct-08	08:55:08	20.1	35.0	31.9			
Test # 2:							
30-Oct-08	08:55:08	20.1	35.0	31.9	24406	3.9E-07	3.9E-07
30-Oct-08	15:41:54	21.1	34.0	30.9			
Test # 3:							
31-Oct-08	15:32:00	21.1	30.1	27.0	234653	3.9E-07	3.9E-07
03-Nov-08	08:42:53	20.6	22.6	19.5			

***Average Ksat* (cm/sec):** **3.9E-07**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: A. Barraza/ K. Wright/ D. O'Dowd
Data entered by: A. Barraza
Checked by: J. Hines

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-LEP-01B-SG
Project Name: OU4-Phase I
Project Number: 136259

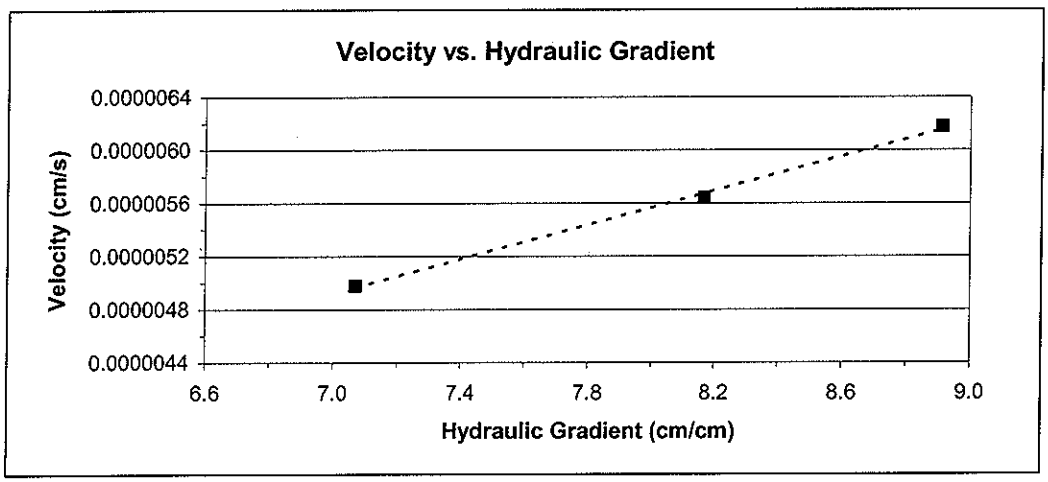
Type of water used: TAP
Backpressure (psi): 0.0
Offset (cm): 0.2
Sample length (cm): 4.30
Sample x-sectional area (cm^2): 10.53
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
22-Oct-08	11:51:14	21.4	42.1	41.9	75887	7.0E-07	6.8E-07
23-Oct-08	08:56:01	20.4	35.0	34.8			
Test # 2:							
23-Oct-08	16:04:10	21.5	32.8	32.6	58760	7.1E-07	6.8E-07
24-Oct-08	08:23:30	21.1	28.4	28.2			
Test # 3:							
27-Oct-08	08:42:45	20.6	39.0	38.8	86633	6.9E-07	6.8E-07
28-Oct-08	08:46:38	20.3	31.7	31.5			

***Average Ksat* (cm/sec):** **6.8E-07**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: A. Barraza/ K. Wright/ D. O'Dowd
Data entered by: R. Marshall
Checked by: J. Hines

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-LEP-03A-SG
Project Name: OU4-Phase I
Project Number: 136259

Type of water used: TAP
Backpressure (psi): 4.0
Offset (cm): 4.1
Sample length (cm): 4.14
Sample x-sectional area (cm^2): 10.45
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
03-Nov-08	10:17:20	20.8	101.2	378.4	80776	9.1E-10	8.9E-10
04-Nov-08	08:43:36	20.4	101.1	378.3			
Test # 2:							
04-Nov-08	16:19:25	20.1	101.1	378.3	83843	8.7E-10	8.7E-10
05-Nov-08	15:36:48	20.1	101.0	378.2			
Test # 3:							
06-Nov-08	15:11:20	20.0	101.0	378.2	331080	7.8E-10	7.7E-10
10-Nov-08	11:09:20	20.0	100.7	377.8			

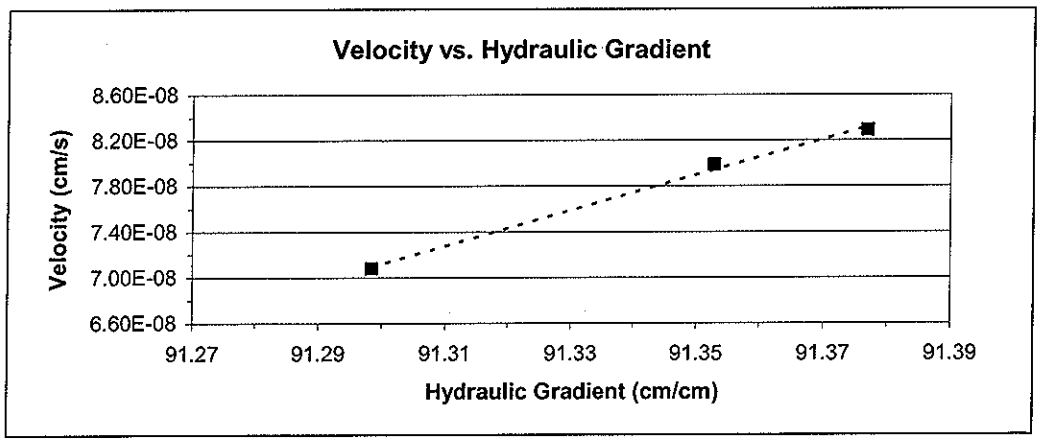
Average Ksat* (cm/sec):** **≤8.5E-10
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed

* = Outflow was not detected after seventeen days of testing, even though sample was saturated. Results above are based on flow into sample. Reported conductivity is at the limit of the testing apparatus; the result is less than or equal to the reported conductivity.



Laboratory analysis by: A. Barraza/ K. Wright/ D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-LEP-03B-SG
Project Name: OU4-Phase I
Project Number: 136259

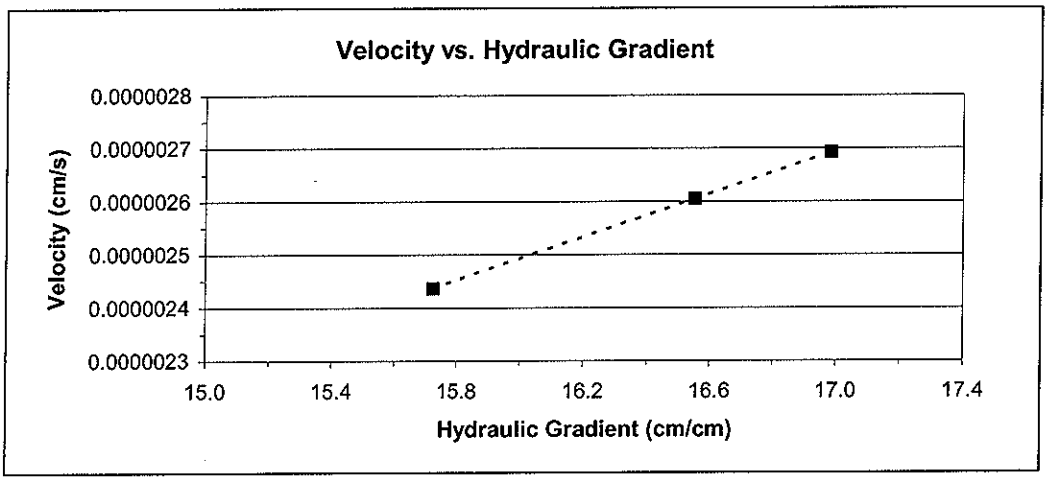
Type of water used: TAP
Backpressure (psi): 0.0
Offset (cm): 0.6
Sample length (cm): 3.89
Sample x-sectional area (cm^2): 10.58
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
28-Oct-08	08:55:56	20.3	67.2	66.6	25036	1.6E-07	1.5E-07
28-Oct-08	15:53:12	21.6	66.2	65.6			
Test # 2:							
28-Oct-08	15:53:12	21.6	66.2	65.6	60868	1.5E-07	1.5E-07
29-Oct-08	08:47:40	20.0	63.8	63.2			
Test # 3:							
29-Oct-08	16:42:23	21.6	62.8	62.2	58228	1.5E-07	1.5E-07
30-Oct-08	08:52:51	20.1	60.7	60.1			

***Average Ksat* (cm/sec):** **1.5E-07**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: A. Barraza/ K. Wright/ D. O'Dowd
Data entered by: A. Barraza
Checked by: J. Hines

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-LEP-05A-SG
Project Name: OU4-Phase I
Project Number: 136259

Type of water used: TAP
Backpressure (psi): 0.0
Offset (cm): 4.4
Sample length (cm): 4.60
Sample x-sectional area (cm^2): 10.47
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
27-Oct-08	09:38:48	20.6	76.3	71.9	19819	3.2E-08	3.2E-08
27-Oct-08	15:09:07	21.3	76.2	71.8			
Test # 2:							
30-Oct-08	15:44:37	21.1	75.2	70.8	85421	2.8E-08	2.7E-08
31-Oct-08	15:28:18	21.1	74.6	70.2			
Test # 3:							
05-Nov-08	15:36:13	20.1	72.2	67.8	84880	2.4E-08	2.4E-08
06-Nov-08	15:10:53	20.0	71.7	67.3			

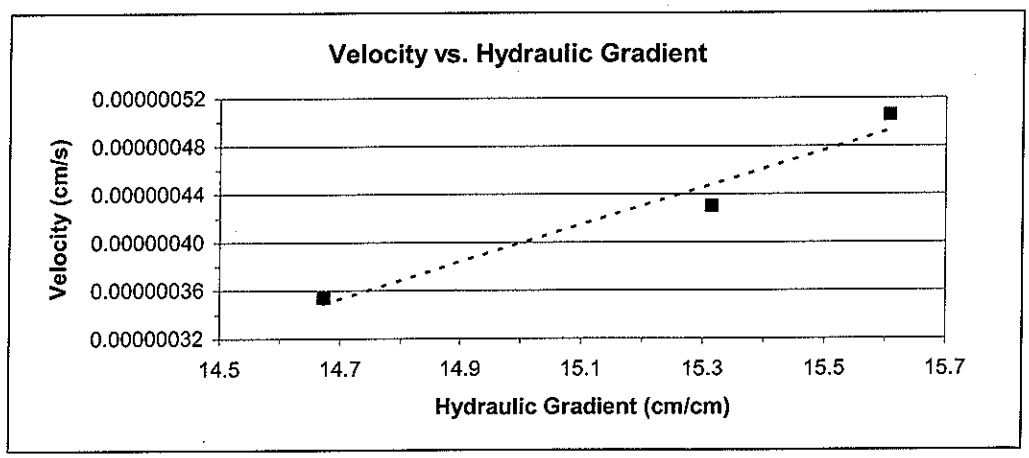
Average Ksat* (cm/sec):** **≤2.8E-08
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed

* = Outflow was not detected after seventeen days of testing, even though sample was saturated. Results above are based on flow into sample. Reported conductivity is at the limit of the testing apparatus; the result is less than or equal to the reported conductivity.



Laboratory analysis by: A. Barraza/ K. Wright/ D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-LEP-05B-SG
Project Name: OU4-Phase I
Project Number: 136259

Type of water used: TAP
Backpressure (psi): 2.5
Offset (cm): 0.2
Sample length (cm): 4.34
Sample x-sectional area (cm^2): 10.50
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
29-Oct-08	08:52:20	20.0	75.5	251.1	86601	1.2E-08	1.2E-08
30-Oct-08	08:55:41	20.1	74.6	250.2			
Test # 2:							
30-Oct-08	08:55:41	20.1	74.6	250.2	110219	1.1E-08	1.1E-08
31-Oct-08	15:32:40	21.1	73.5	249.1			
Test # 3:							
31-Oct-08	15:32:40	21.1	73.5	249.1	234664	9.9E-09	9.7E-09
03-Nov-08	08:43:44	20.6	71.5	247.1			

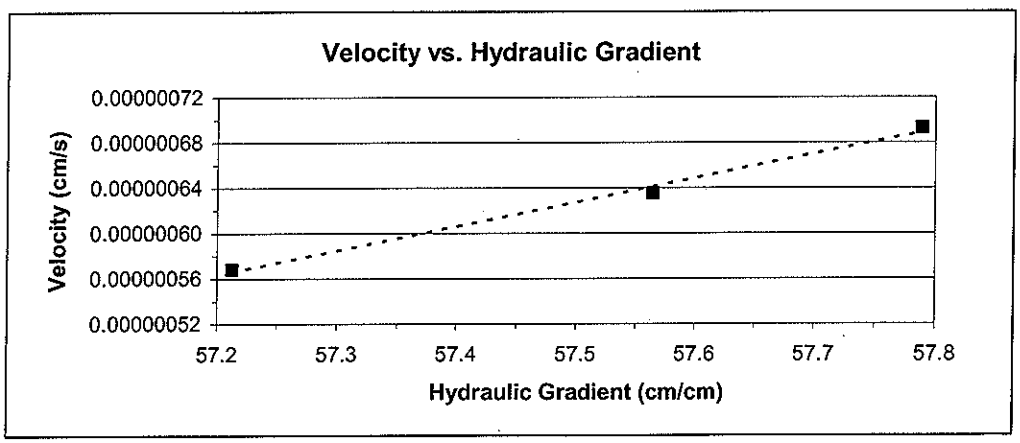
Average Ksat* (cm/sec):** **≤1.1E-08
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed

* = Outflow was not detected after seventeen days of testing, even though sample was saturated. Results above are based on flow into sample. Reported conductivity is at the limit of the testing apparatus; the result is less than or equal to the reported conductivity.



Laboratory analysis by: A. Barraza/ K. Wright/ D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Constant Head Method

Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-UEP-07A-SG
Project Name: OU4-Phase I
Project Number: 136259

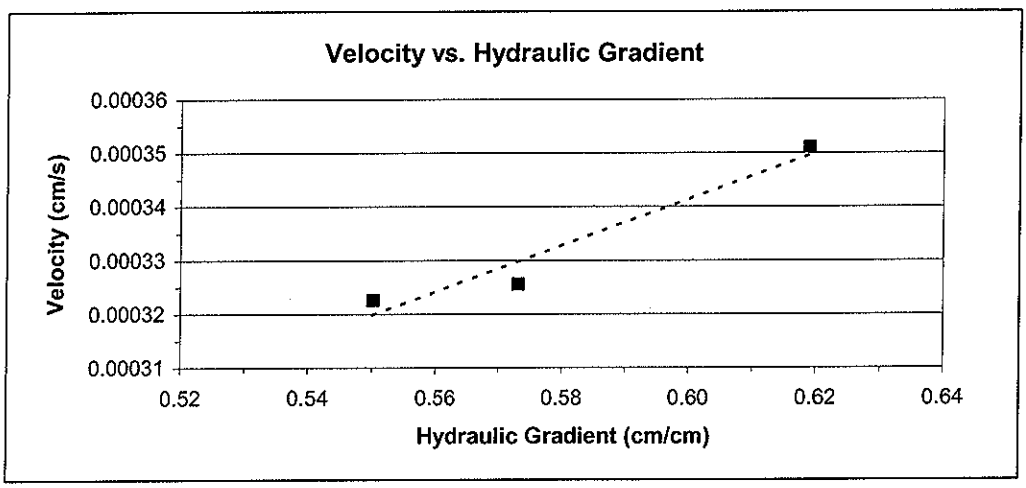
Type of water used: TAP
Collection vessel tare (g): 9.20
Sample length (cm): 4.36
Sample diameter (cm): 3.63
Sample x-sectional area (cm^2): 10.33

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
28-Oct-08	12:57:19	21.3	2.7	15.7	6.5	1778	5.7E-04	5.5E-04
28-Oct-08	13:26:57							
Test # 2:								
28-Oct-08	15:38:20	21.6	2.5	14.3	5.1	1519	5.7E-04	5.5E-04
28-Oct-08	16:03:39							
Test # 3:								
28-Oct-08	16:24:01	21.6	2.4	11.2	2.0	600	5.9E-04	5.7E-04
28-Oct-08	16:34:01							

***Average Ksat* (cm/sec):** **5.5E-04**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: A. Barraza
Data entered by: R. Marshall
Checked by: J. Hines

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-UEP-07B-SG
Project Name: OU4-Phase I
Project Number: 136259

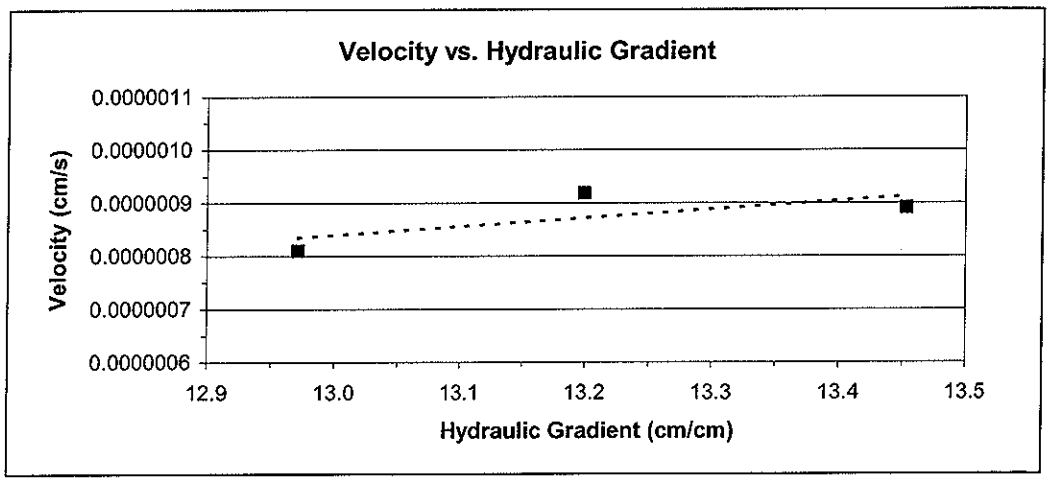
Type of water used: TAP
Backpressure (psi): 0.0
Offset (cm): 4.4
Sample length (cm): 4.72
Sample x-sectional area (cm^2): 10.43
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
27-Oct-08	09:39:52	20.6	68.5	64.1	90366	6.6E-08	6.5E-08
28-Oct-08	10:45:58	20.6	67.3	62.9			
Test # 2:							
28-Oct-08	10:45:58	20.6	67.3	62.9	87626	7.0E-08	6.9E-08
29-Oct-08	11:06:24	20.4	66.1	61.7			
Test # 3:							
29-Oct-08	11:06:24	20.4	66.1	61.7	78653	6.2E-08	6.2E-08
30-Oct-08	08:57:17	20.1	65.2	60.8			

***Average Ksat* (cm/sec):** **6.5E-08**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: A. Barraza/ K. Wright/ D. O'Dowd
Data entered by: A. Barraza
Checked by: J. Hines

Saturated Hydraulic Conductivity
Constant Head Method

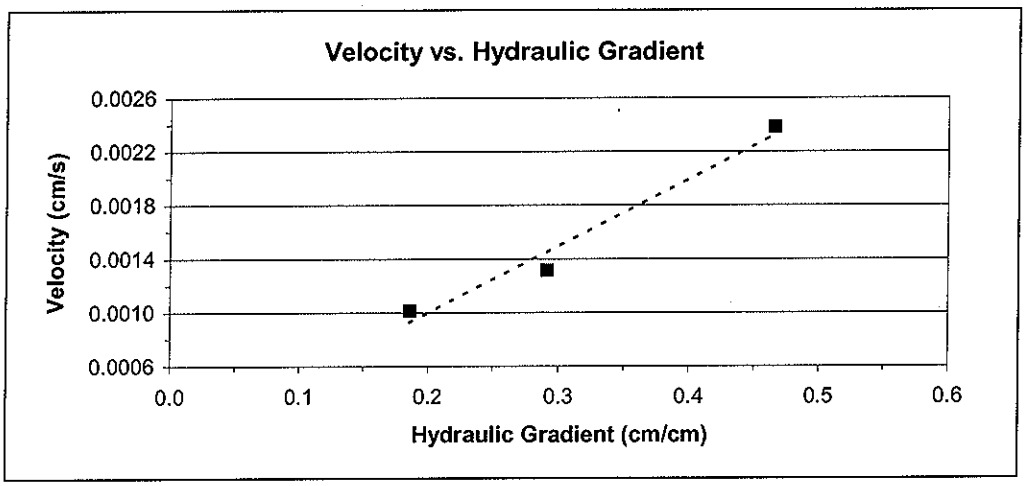
Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-UEP-08A-SG
Project Name: OU4-Phase I
Project Number: 136259

Type of water used: TAP
Collection vessel tare (g): 9.19
Sample length (cm): 4.29
Sample diameter (cm): 3.67
Sample x-sectional area (cm^2): 10.58

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
27-Oct-08	10:27:51	20.9	2.0	24.6	15.4	612	5.1E-03	5.0E-03
27-Oct-08	10:38:03							
Test # 2:								
28-Oct-08	12:56:48	21.3	0.8	24.9	15.7	1468	5.4E-03	5.3E-03
28-Oct-08	13:21:16							
Test # 3:								
28-Oct-08	14:06:00	21.5	1.3	20.5	11.3	816	4.5E-03	4.4E-03
28-Oct-08	14:19:36							

***Average Ksat* (cm/sec):** **4.9E-03**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:
--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: A. Barraza/ R. Marshall
Data entered by: R. Marshall
Checked by: J. Hines

Saturated Hydraulic Conductivity
Constant Head Method

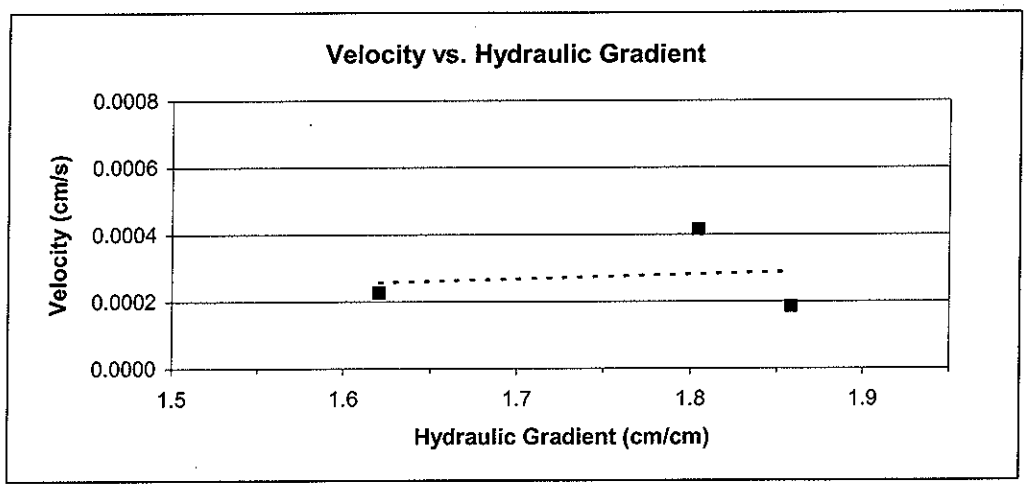
Job name: Brown and Caldwell
Job number: LB08.0184.00
Sample number: OU4-UEP-08B-SG
Project Name: OU4-Phase I
Project Number: 136259

Type of water used: TAP
Collection vessel tare (g): 9.19
Sample length (cm): 4.63
Sample diameter (cm): 3.63
Sample x-sectional area (cm^2): 10.35

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
24-Oct-08	13:23:52	20.1	8.4	13.3	4.1	943	2.3E-04	2.3E-04
24-Oct-08	13:39:35							
Test # 2:								
23-Oct-08	11:03:37	20.5	7.5	11.7	2.5	1056	1.4E-04	1.4E-04
23-Oct-08	11:21:13							
Test # 3:								
23-Oct-08	14:55:03	20.1	8.6	12.0	2.8	1463	1.0E-04	9.9E-05
23-Oct-08	15:19:26							

***Average Ksat* (cm/sec):** **1.6E-04**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:
--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: A. Barraza
Data entered by: R. Marshall
Checked by: J. Hines

Moisture Retention Characteristics

Summary of Moisture Characteristics of the Initial Drainage Curve

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-LEP-01A-SG	0	36.5
	63	35.5
	205	34.4
	357	33.3
	1428	30.8
	45483	6.8
	311039	3.0
	851293	2.1
OU4-LEP-01B-SG	0	40.4
	51	36.9
	510	33.0
	1530	29.2
	68531	8.4
	400781	5.3
	851293	3.2
OU4-LEP-03A-SG	0	46.4 ⌗
	51	46.1 ⌗
	149	46.6 ⌗
	337	43.7 ⌗
	1479	43.2 ⌗
	203960	15.9 ⌗
	851293	7.4 ⌗
OU4-LEP-03B-SG	0	41.9
	51	39.6
	612	32.9
	1530	32.2
	79340	12.3
	184584	9.5
	851293	3.9

⌗ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-LEP-05A-SG	0	43.5 ⌗
	52	44.8 ⌗
	155	44.9 ⌗
	337	43.1 ⌗
	1479	43.3 ⌗
	283504	8.4 ⌗
	851293	5.2 ⌗
OU4-LEP-05B-SG	0	46.9
	55	46.5 ⌗
	154	46.4 ⌗
	337	44.7 ⌗
	1479	44.2 ⌗
	74751	15.1 ⌗
	249851	9.8 ⌗
	851293	4.4 ⌗
OU4-UEP-07A-SG	0	46.5
	17	35.3
	31	29.2
	105	21.7
	510	18.6
	74037	7.8
	219257	6.5
	851293	3.0
OU4-UEP-07B-SG	0	43.5
	51	39.2
	612	36.1
	1530	34.9
	24271	17.6
	130534	10.8
	851293	6.0

⌗ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-UEP-08A-SG	0	36.4 ⌗
	5	33.0 ⌗
	20	14.4 ⌗
	46	6.7 ⌗
	82	6.3 ⌗
	520	5.5 ⌗
	103000	2.1 ⌗
	851293	1.3 ⌗
OU4-UEP-08B-SG	0	43.0
	25	40.8
	64	28.8
	123	21.3
	510	17.2
	276366	4.6
	851293	3.3

⌗ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Calculated Unsaturated Hydraulic Properties

Sample Number	α (cm^{-1})	N (dimensionless)	θ_r (% vol)	θ_s (% vol)	Oversize Corrected θ_r (% vol)	Oversize Corrected θ_s (% vol)
OU4-LEP-01A-SG	0.0005	1.5134	0.00	35.33	NA	NA
OU4-LEP-01B-SG	0.0013	1.3300	0.00	38.52	NA	NA
OU4-LEP-03A-SG	0.0002	1.3321	0.00	45.57	NA	NA
OU4-LEP-03B-SG	0.0015	1.2650	0.00	40.57	NA	NA
OU4-LEP-05A-SG	0.0001	1.4674	0.00	44.16	NA	NA
OU4-LEP-05B-SG	0.0002	1.4282	0.00	46.21	NA	NA
OU4-UEP-07A-SG	0.2495	1.2138	1.29	46.57	NA	NA
OU4-UEP-07B-SG	0.0009	1.2814	0.00	41.07	NA	NA
OU4-UEP-08A-SG	0.1093	2.2461	2.99	36.64	NA	NA
OU4-UEP-08B-SG	0.0316	1.4777	3.86	44.15	NA	NA

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed

Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01A-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 78.43
Tare wt., ring (g): 31.80
Tare wt., screen & clamp (g): 23.30
Initial sample volume (cm^3): 46.89
Initial dry bulk density (g/cm^3): 1.67
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 36.88

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content † (% vol)
Hanging column:	5-Nov-08	10:28	150.63	0.00	36.47
	11-Nov-08	11:00	150.18	63.00	35.51
	18-Nov-08	15:00	149.67	205.00	34.42
Pressure plate:	2-Dec-08	10:55	149.16	356.93	33.33
	15-Dec-08	13:00	147.99	1427.72	30.84

Volume Adjusted Data [1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	63.00	---	---	---	---
	205.00	---	---	---	---
Pressure plate:	356.93	---	---	---	---
	1427.72	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: A. Barraza/ K. Wright/ R. Marshall/ D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-LEP-01A-SG

Dry weight of dew point potentiometer sample* (g): 152.68
Tare weight, jar (g): 117.33
Initial sample bulk density (g/cm^3): 1.67

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)
Dew point potentiometer:	3-Nov-08	9:30	154.11	45483.1	6.77
	30-Oct-08	15:00	153.31	311039.0	2.96

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	45483.1	---	---	---	---
	311039.0	---	---	---	---

Dry weight of relative humidity box sample* (g): 70.39
Tare weight (g): 39.93
Initial sample bulk density (g/cm^3): 1.67

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)
Relative humidity box:	5-Nov-08	12:55	70.76	851293	2.07

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

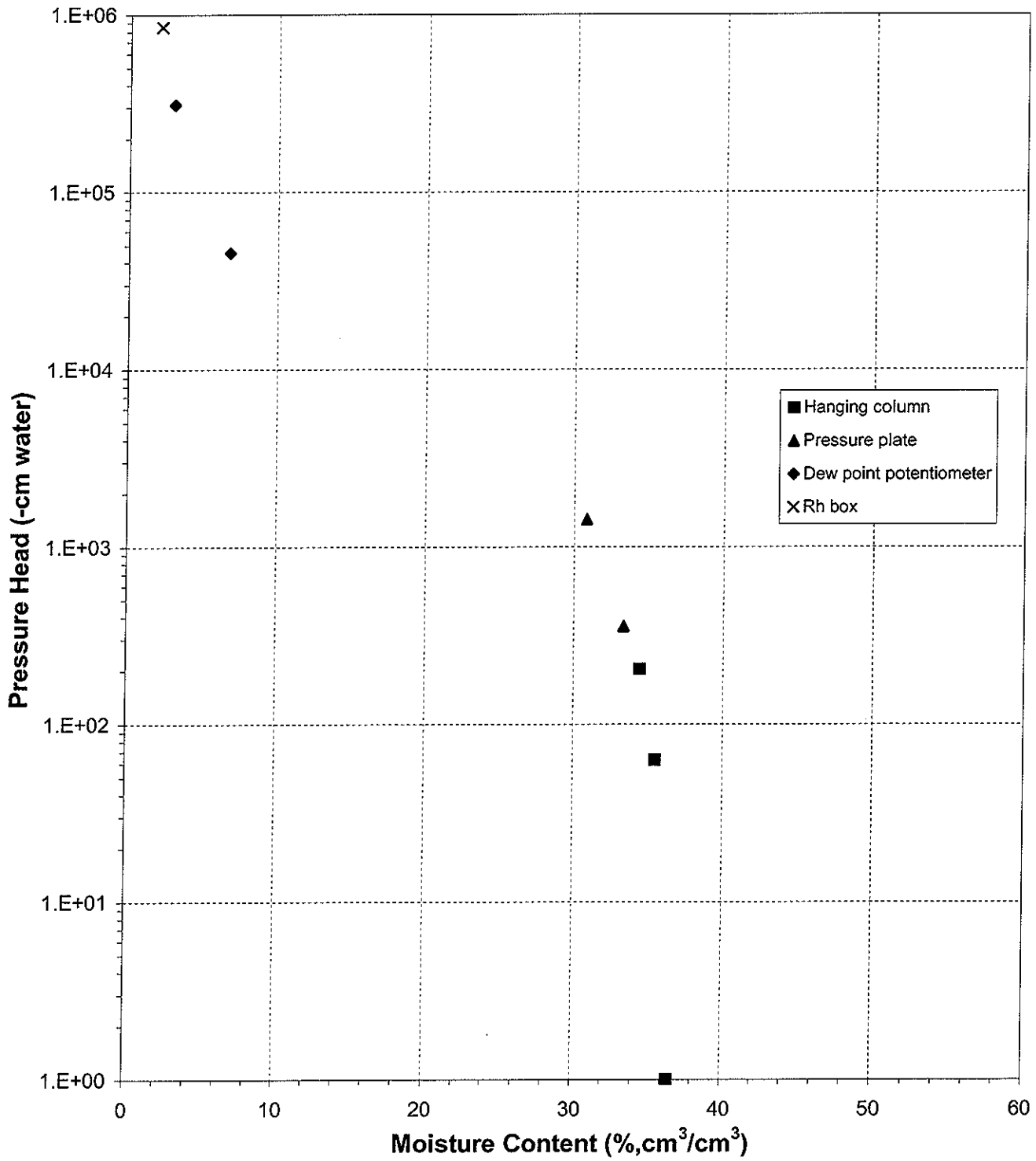
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: T. MendezT. Mendez
Data entered by: C. Krous
Checked by: J. Hines

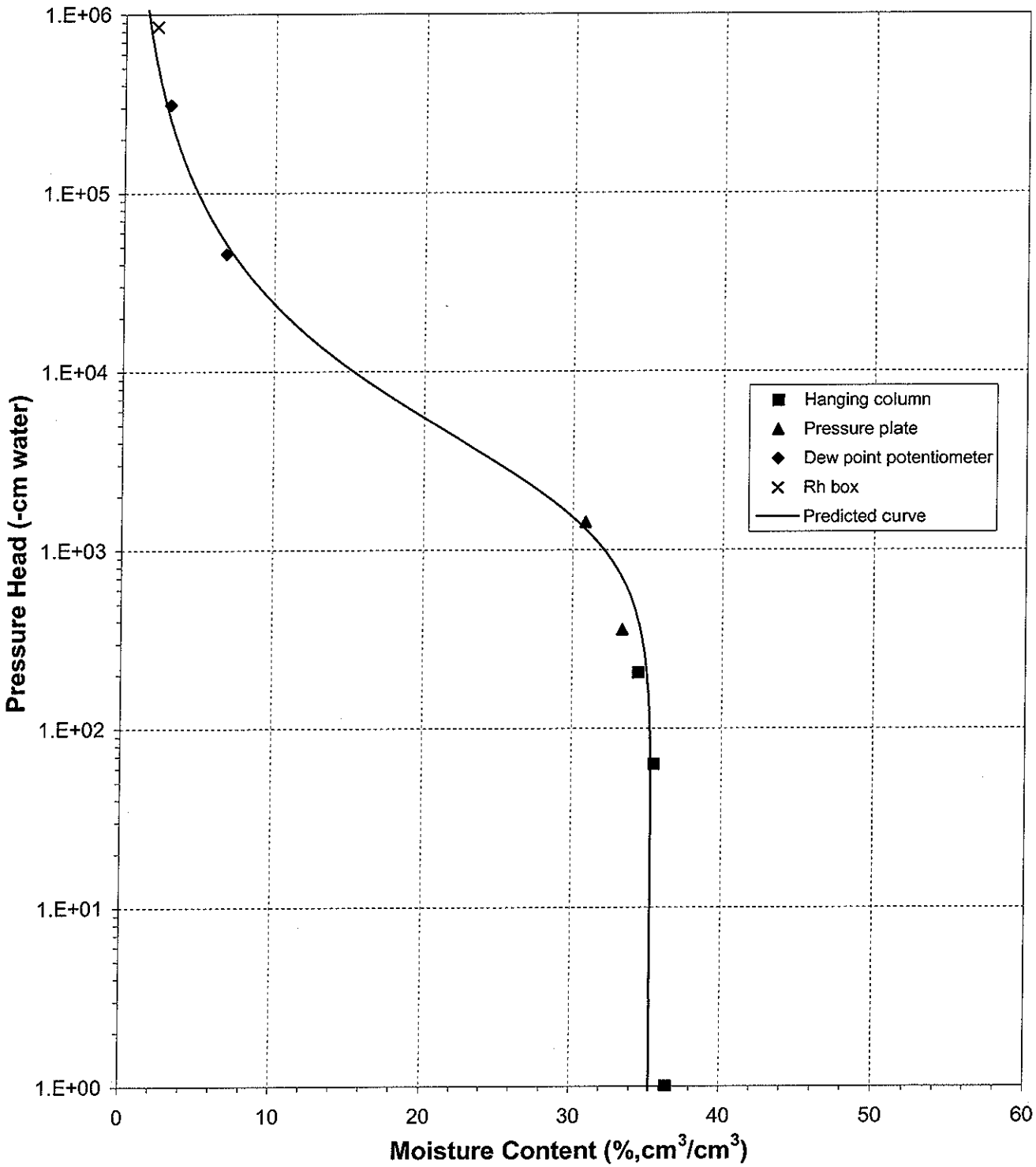
Water Retention Data Points

Sample Number: OU4-LEP-01A-SG



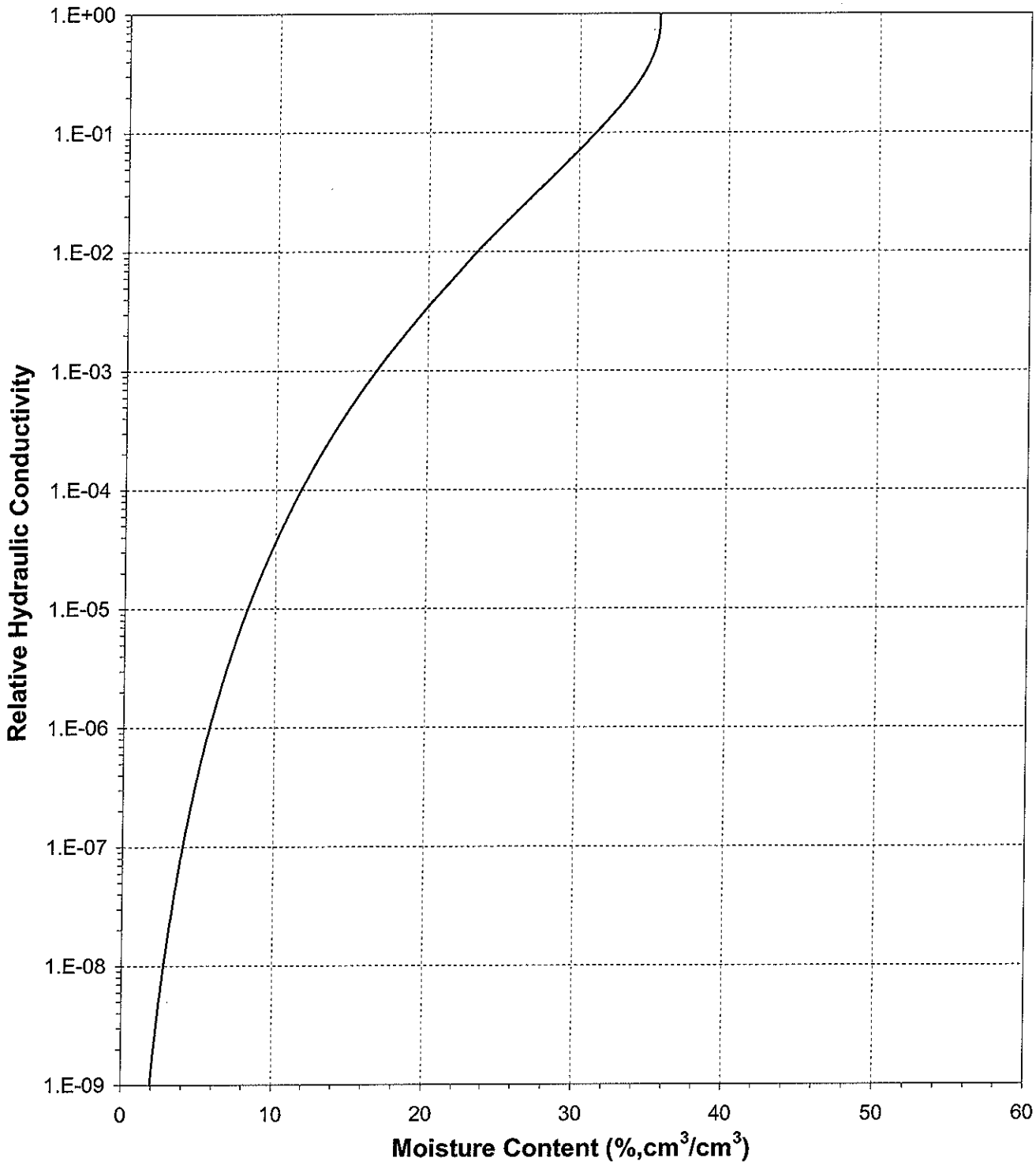
Predicted Water Retention Curve and Data Points

Sample Number: OU4-LEP-01A-SG



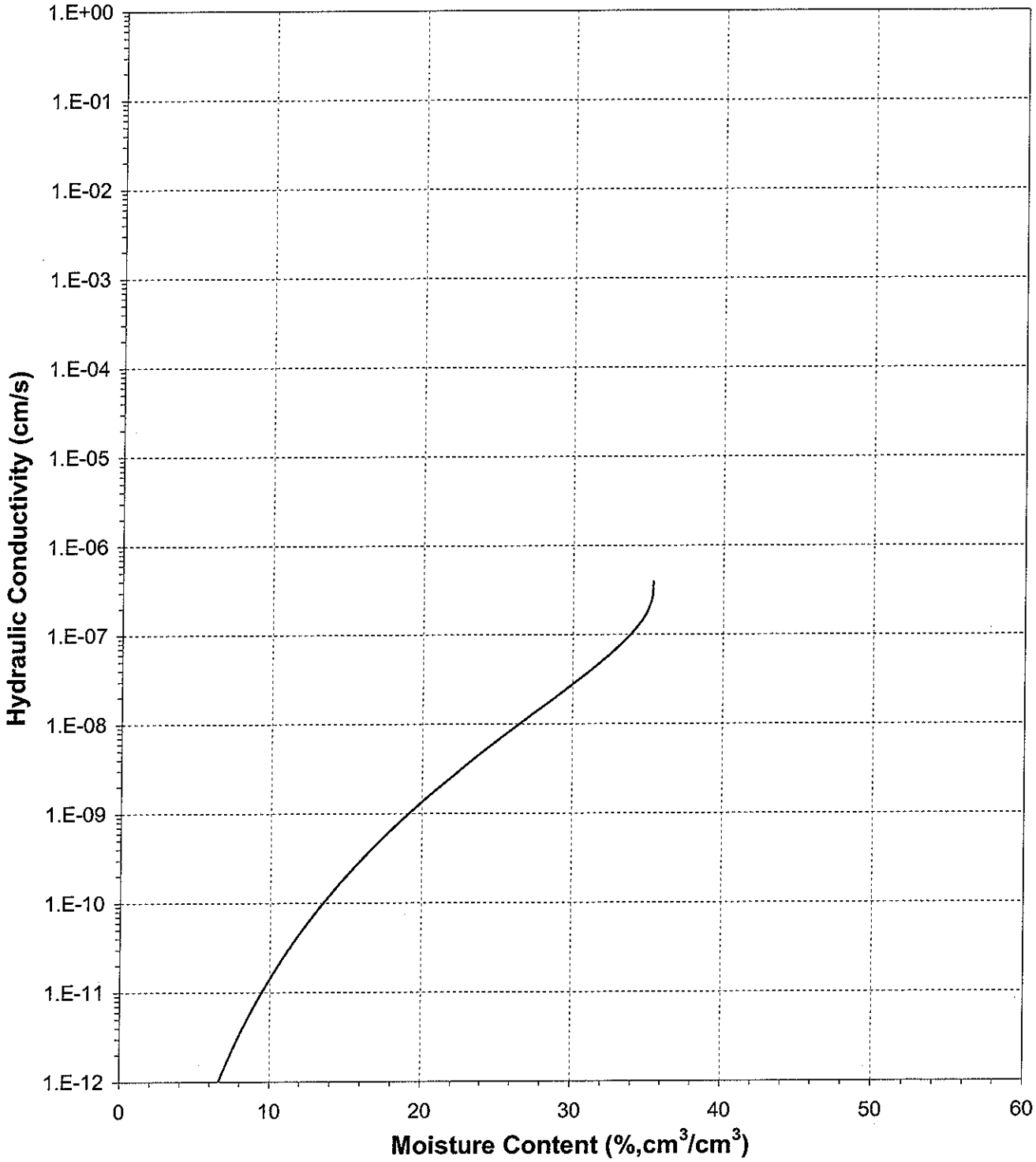
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-01A-SG



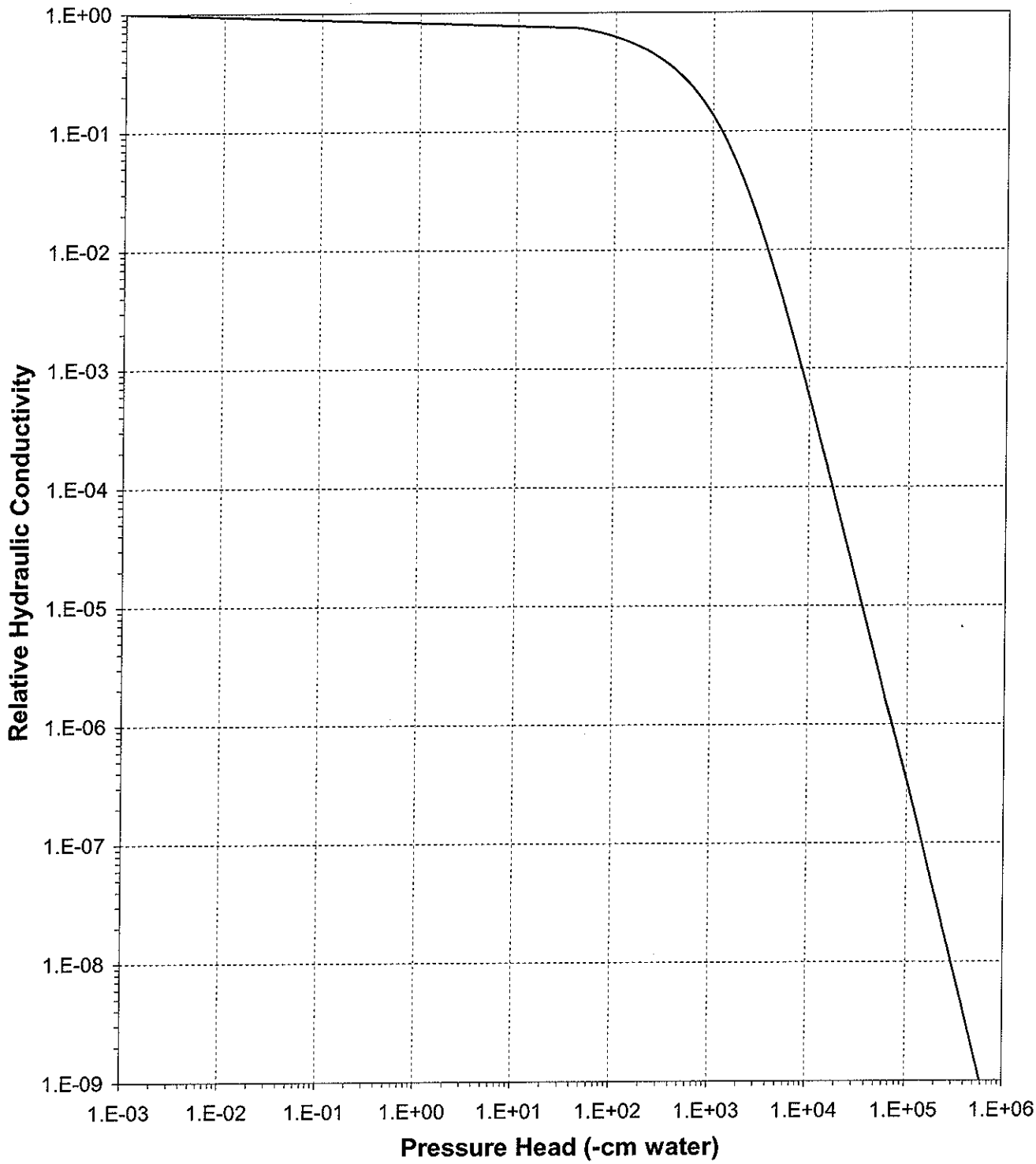
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-01A-SG



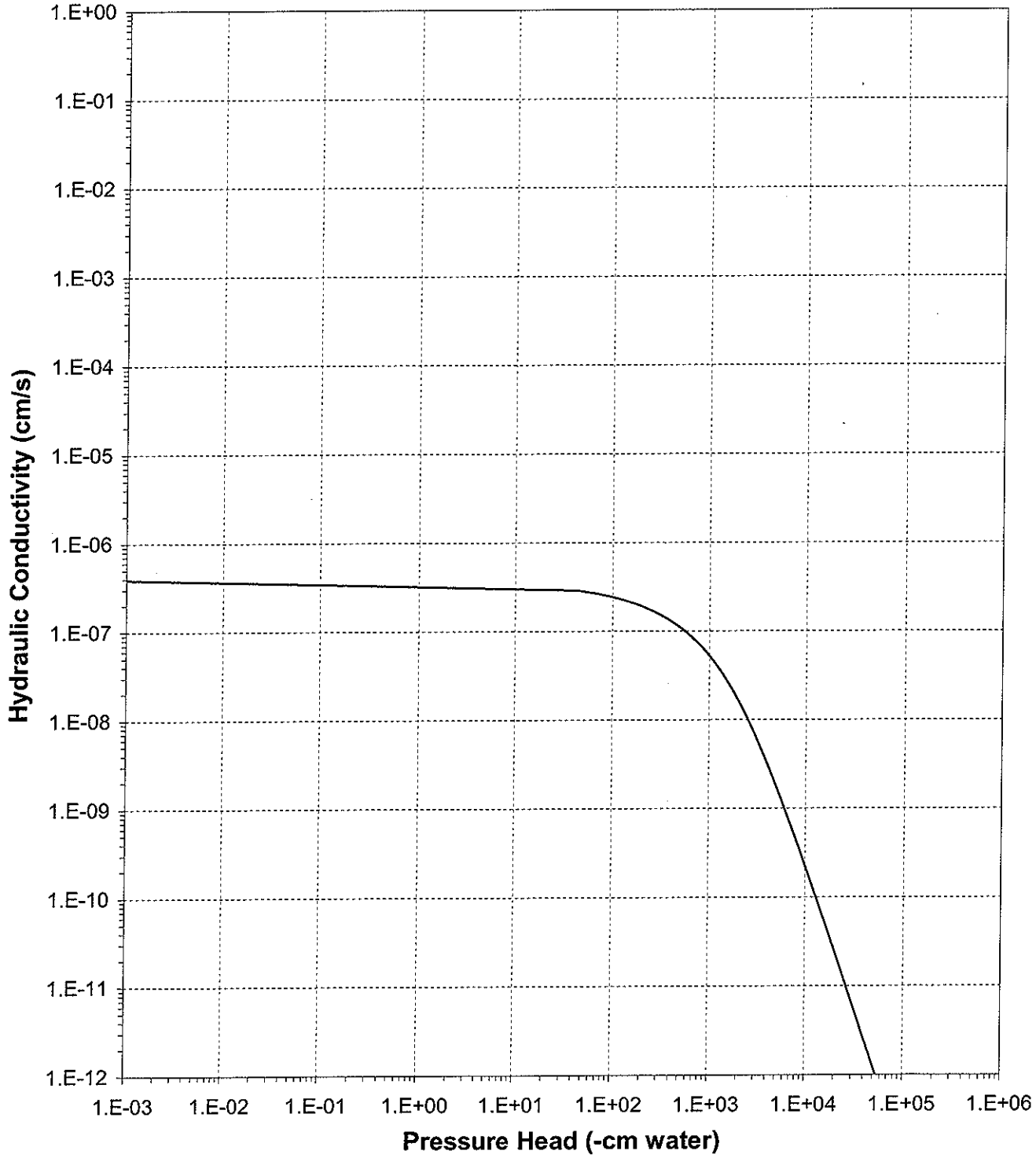
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-01A-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-01A-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01B-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 74.81
Tare wt., ring (g): 31.32
Tare wt., screen & clamp (g): 22.03
Initial sample volume (cm^3): 45.26
Initial dry bulk density (g/cm^3): 1.65
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 37.63

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Hanging column:	30-Oct-08	12:00	146.44	0.00	40.38
	5-Nov-08	12:50	144.86	51.00	36.89
Pressure plate:	18-Nov-08	15:15	143.09	509.90	32.98
	8-Dec-08	10:15	141.37	1529.70	29.18

Volume Adjusted Data[1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	51.00	---	---	---	---
Pressure plate:	509.90	---	---	---	---
	1529.70	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: T. Mendez/ K. Wright/ R. Marshall/ D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-LEP-01B-SG

Dry weight of dew point potentiometer sample* (g): 136.35
Tare weight, jar (g): 115.35
Initial sample bulk density (g/cm^3): 1.65

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)
Dew point potentiometer:	22-Oct-08	15:53	137.42	68530.6	8.41
	27-Oct-08	15:30	137.02	400781.4	5.28

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	68530.6	---	---	---	---
	400781.4	---	---	---	---

Dry weight of relative humidity box sample* (g): 65.66
Tare weight (g): 41.63
Initial sample bulk density (g/cm^3): 1.65

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)
Relative humidity box:	27-Oct-08	8:39	66.12	851293	3.18

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

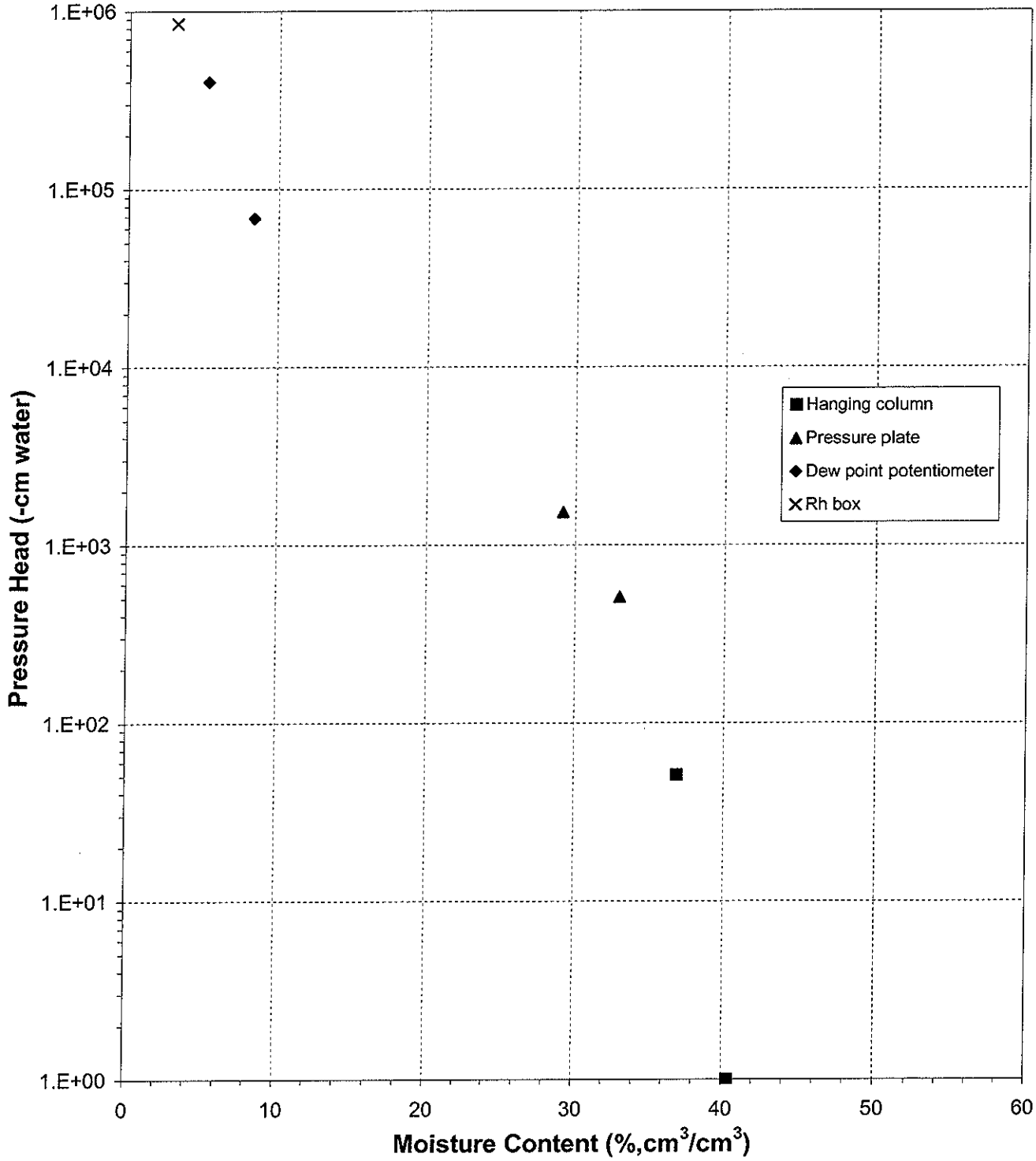
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: K. Mullen/T. MendezK. Mullen/T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

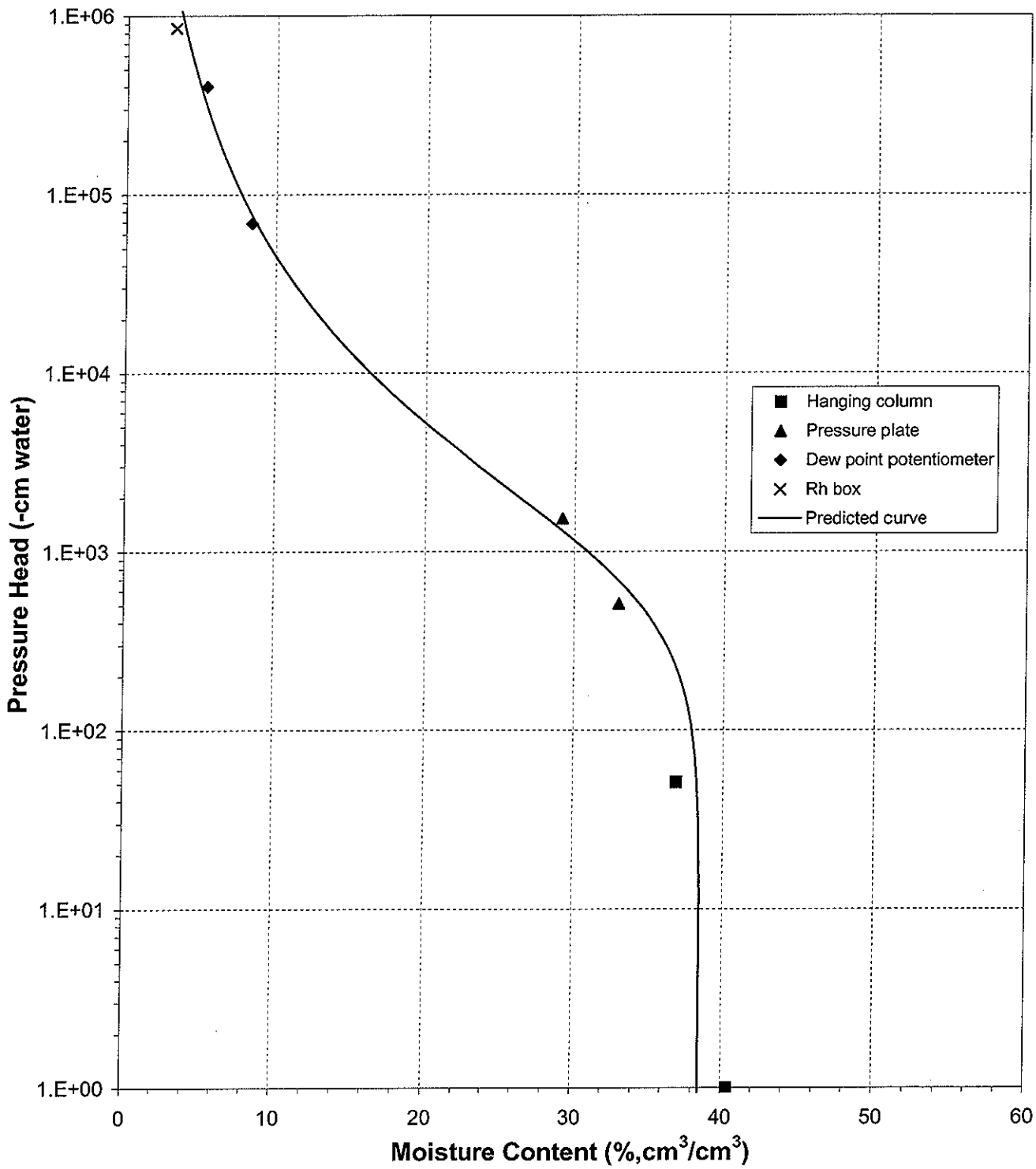
Water Retention Data Points

Sample Number: OU4-LEP-01B-SG



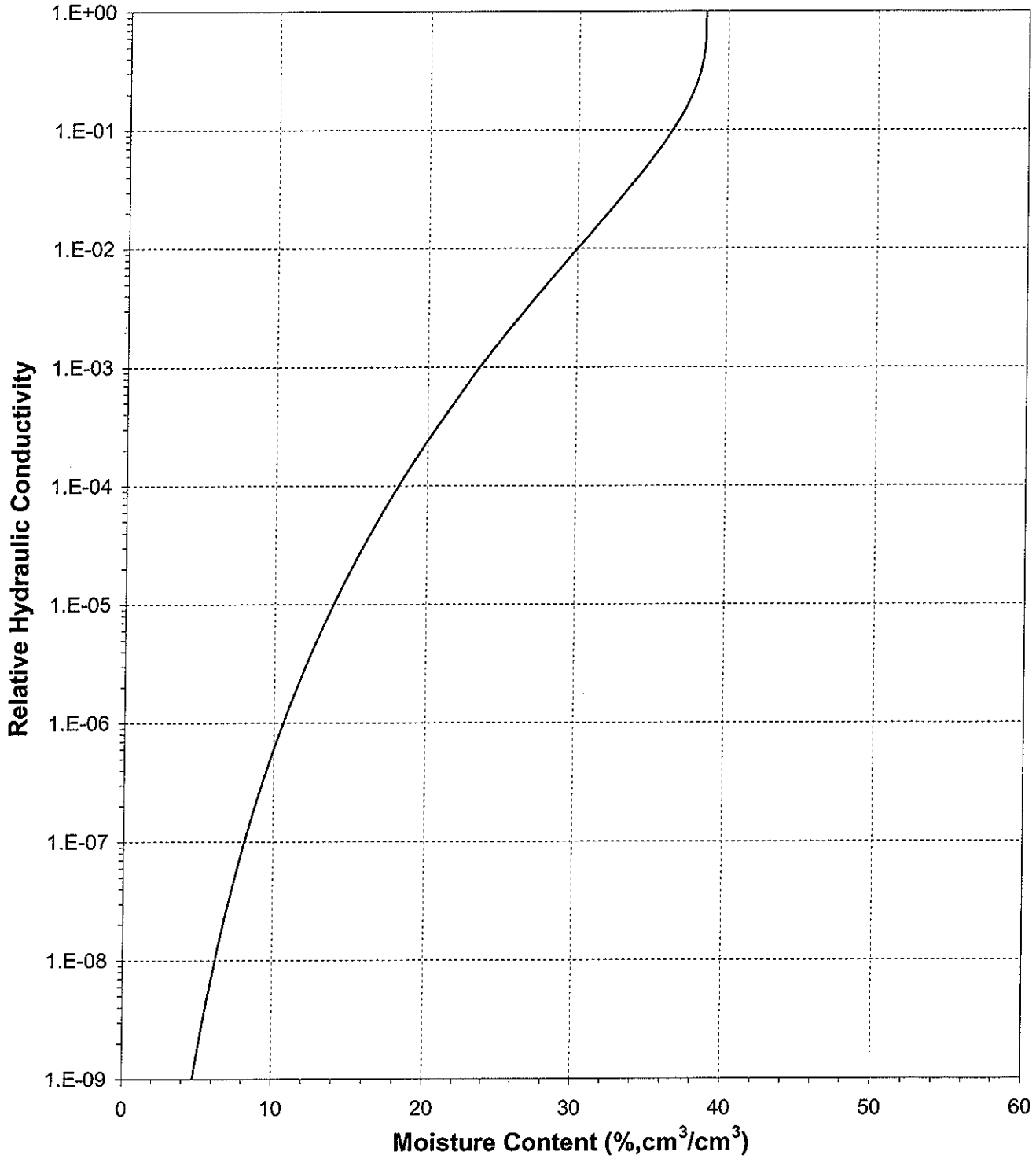
Predicted Water Retention Curve and Data Points

Sample Number: OU4-LEP-01B-SG



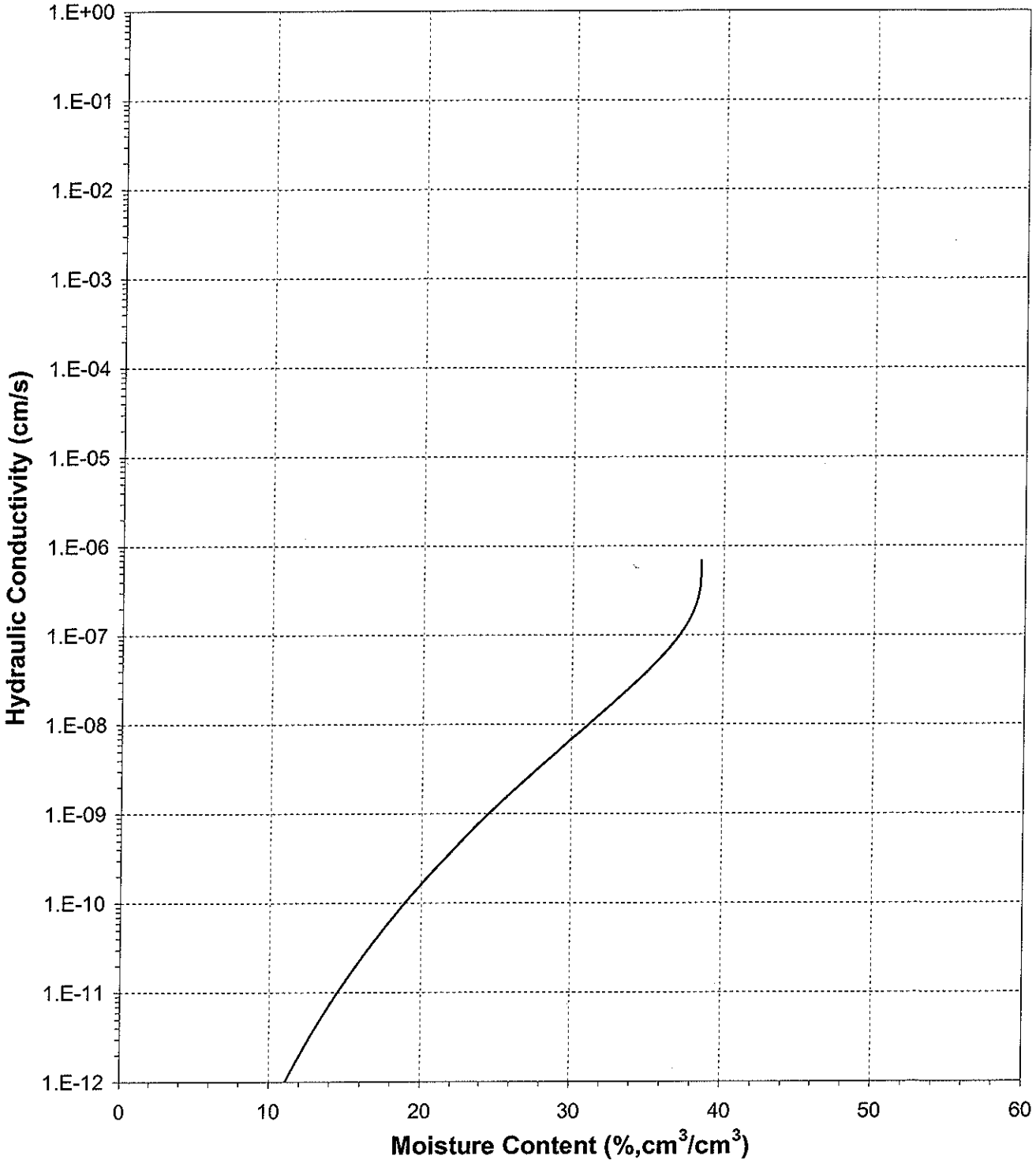
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-01B-SG



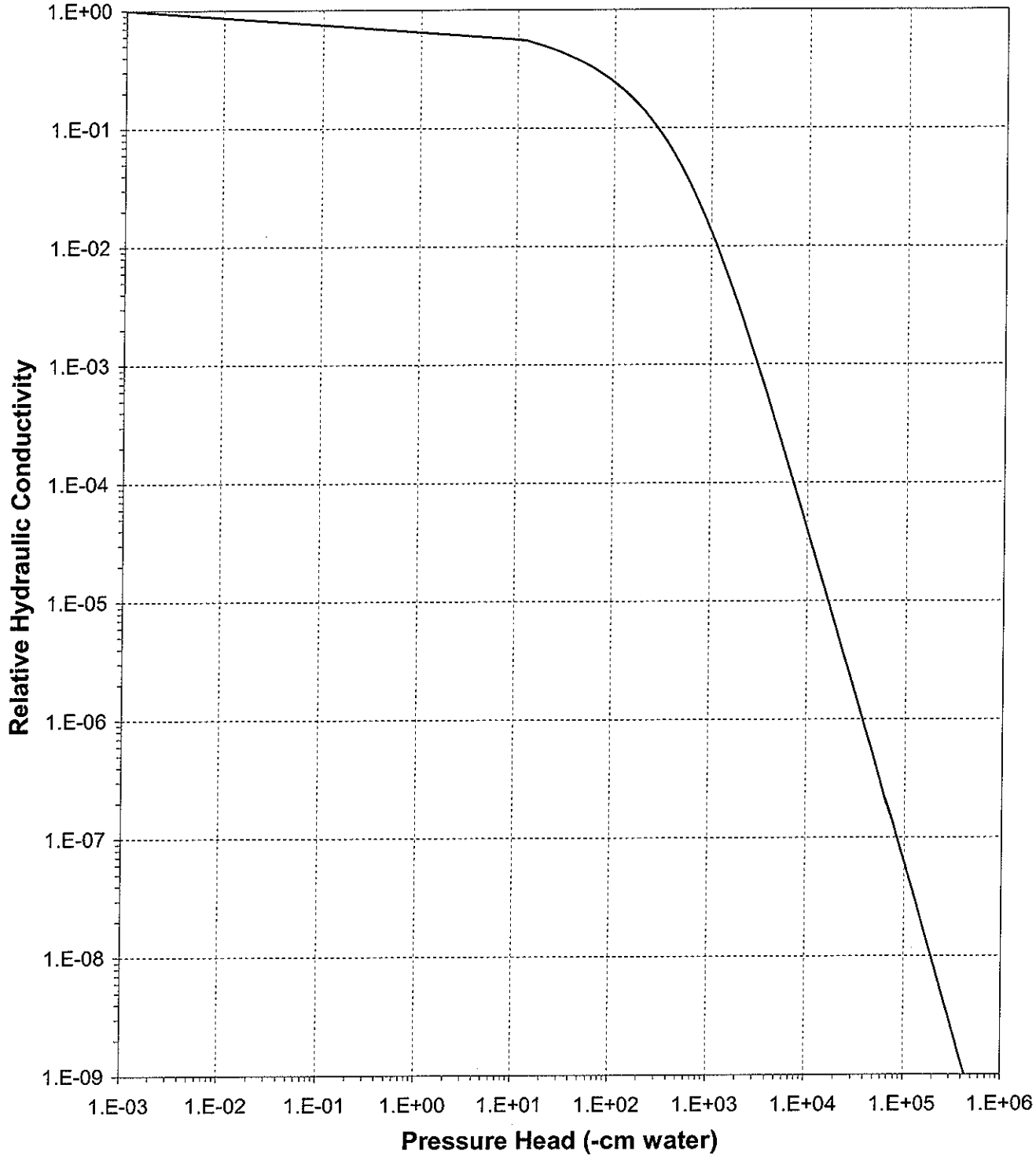
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-01B-SG



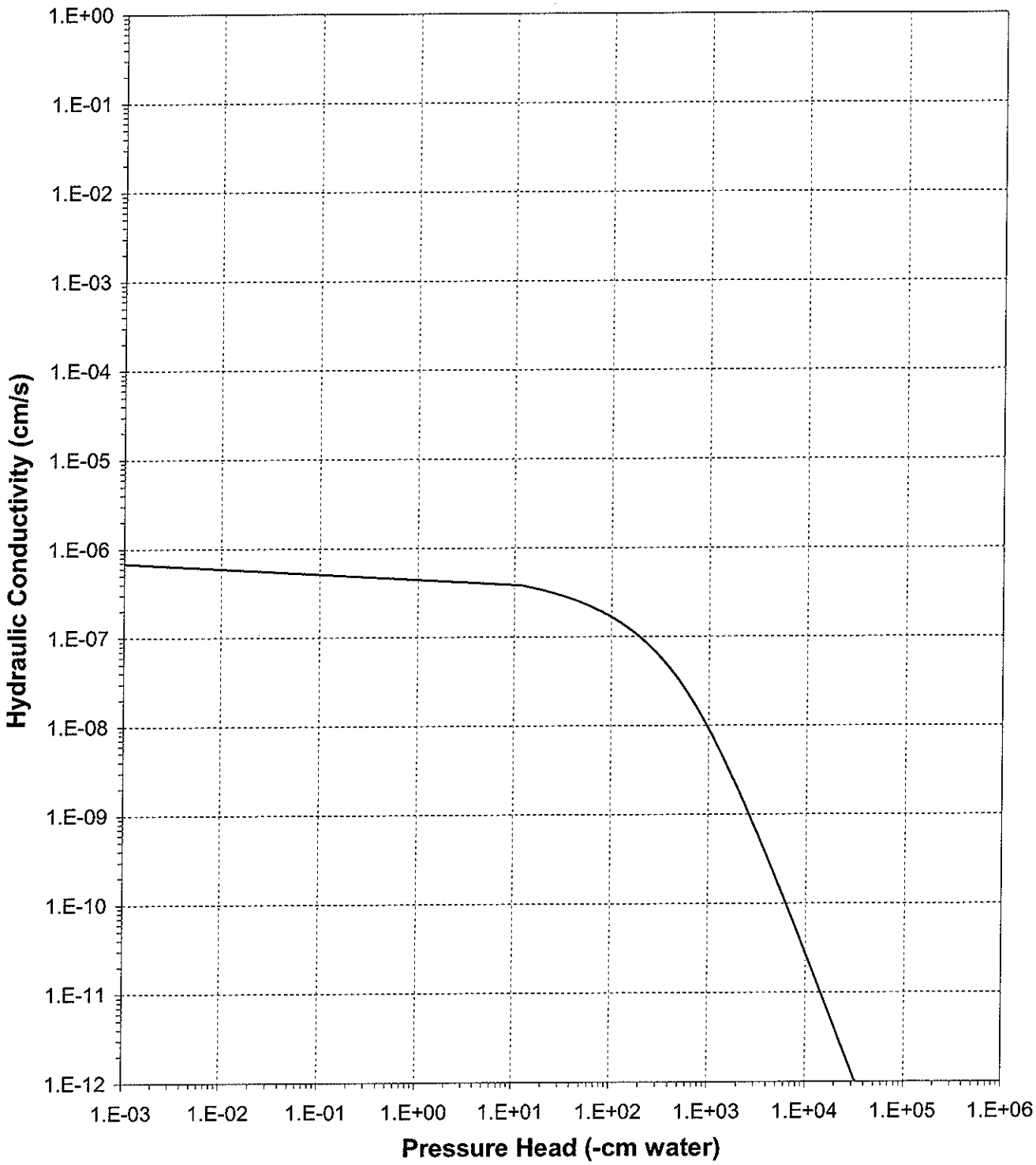
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-01B-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-01B-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03A-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 65.25
Tare wt., ring (g): 34.65
Tare wt., screen & clamp (g): 22.13
Initial sample volume (cm^3): 43.27
Initial dry bulk density (g/cm^3): 1.51
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 43.10

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content † (% vol)	
Hanging column:	11-Nov-08	10:00	142.68	0.00	46.36	‡‡
	17-Nov-08	11:27	142.79	50.50	46.09	‡‡
	24-Nov-08	9:52	142.75	148.50	46.57	‡‡
Pressure plate:	8-Dec-08	12:57	141.40	336.53	43.71	‡‡
	22-Dec-08	15:28	141.11	1478.71	43.16	‡‡

Volume Adjusted Data [1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	44.55	+2.95%	1.46	44.73
	50.50	45.04	+4.08%	1.45	45.33
	148.50	44.49	+2.83%	1.47	44.66
Pressure plate:	336.53	44.32	+2.42%	1.47	44.44
	1478.71	44.21	+2.17%	1.48	44.31

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '—' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Salt Precipate formed on nozzel during Ksat.

Laboratory analysis by: D. O'Dowd/ R. Marshall
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-LEP-03A-SG

Dry weight of dew point potentiometer sample* (g): 161.96
Tare weight, jar (g): 115.56
Initial sample bulk density (g/cm^3): 1.51

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)	
Dew point potentiometer:	22-Oct-08	14:39	166.96	203960.0	15.91	‡‡

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	203960.0	44.21	+2.17%	1.48	44.31

Dry weight of relative humidity box sample* (g): 66.41
Tare weight (g): 36.51
Initial sample bulk density (g/cm^3): 1.51

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)	
Relative humidity box:	5-Nov-08	12:55	67.91	851293	7.38	‡‡

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	44.21	+2.17%	1.48	44.31

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

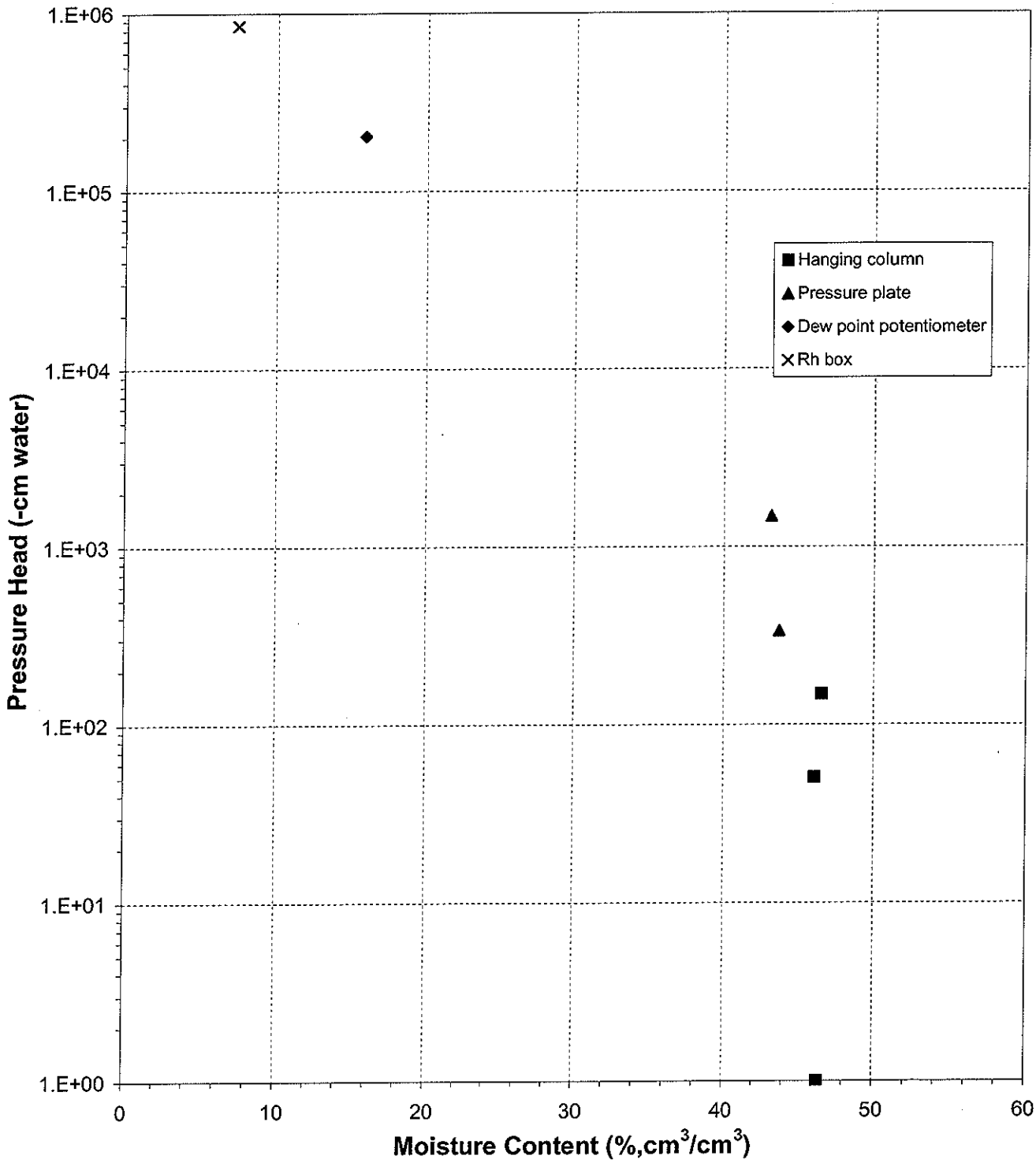
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: K. Mullen/T. Mendez/T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

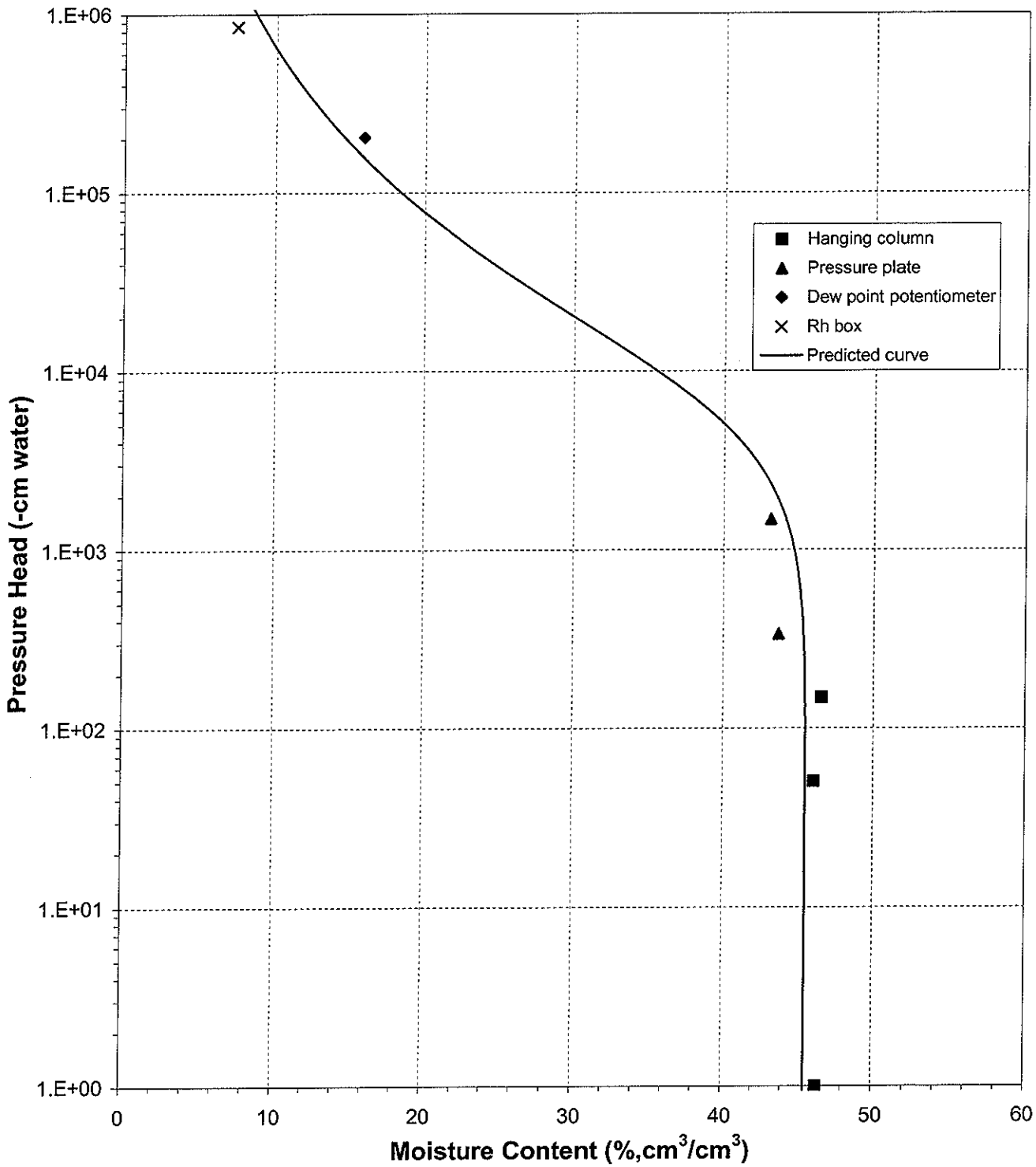
Water Retention Data Points

Sample Number: OU4-LEP-03A-SG



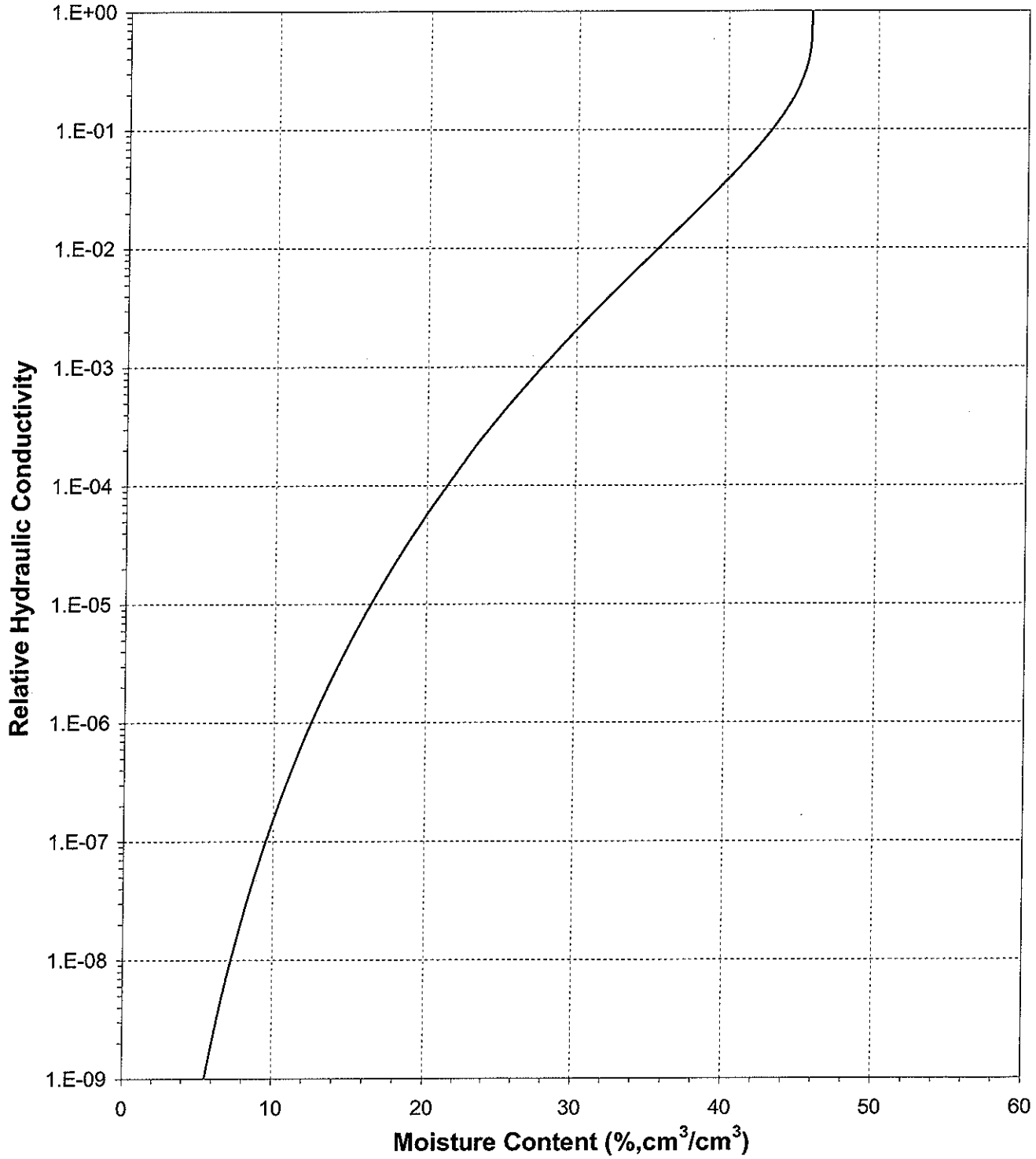
Predicted Water Retention Curve and Data Points

Sample Number: OU4-LEP-03A-SG



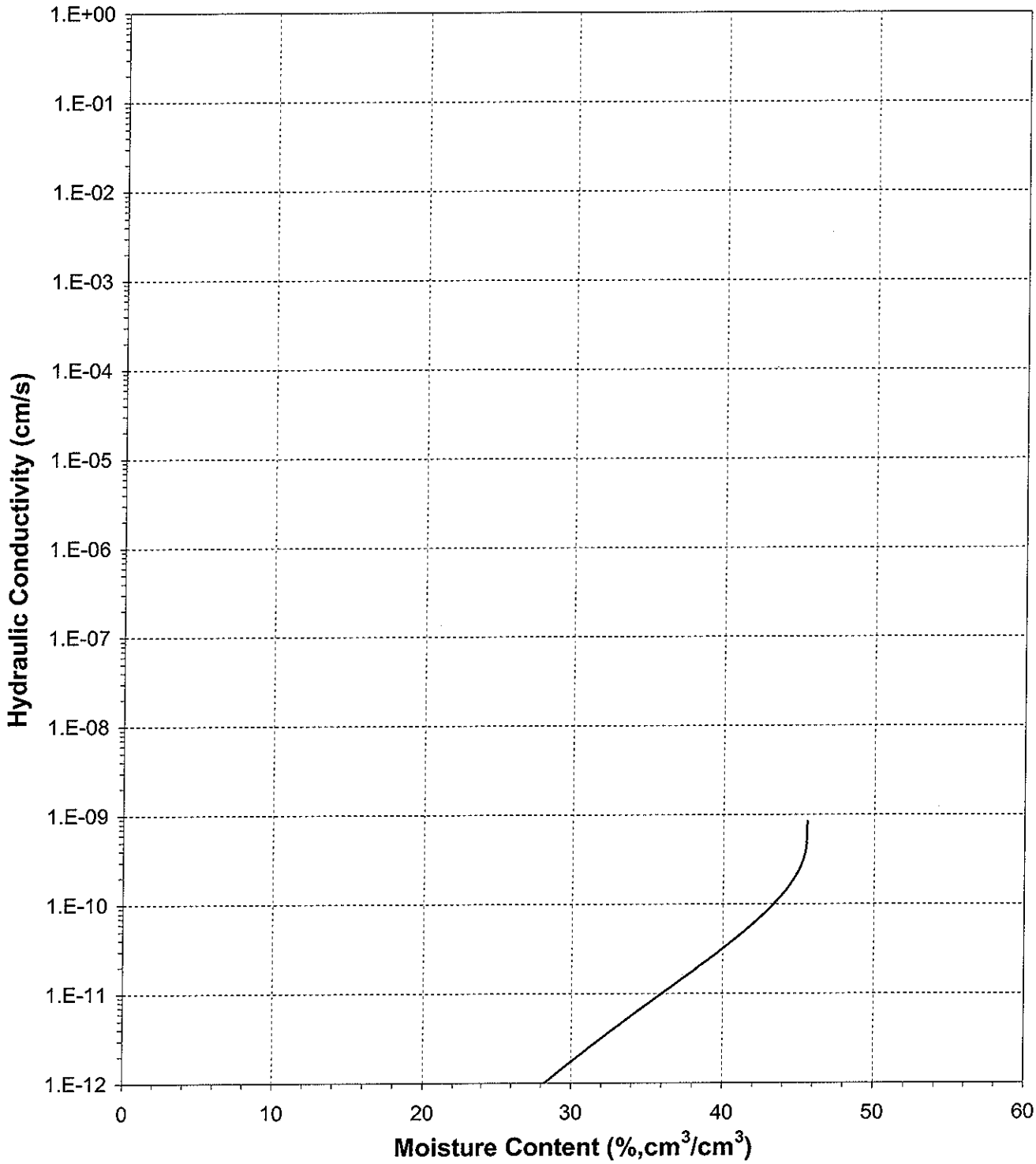
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-03A-SG



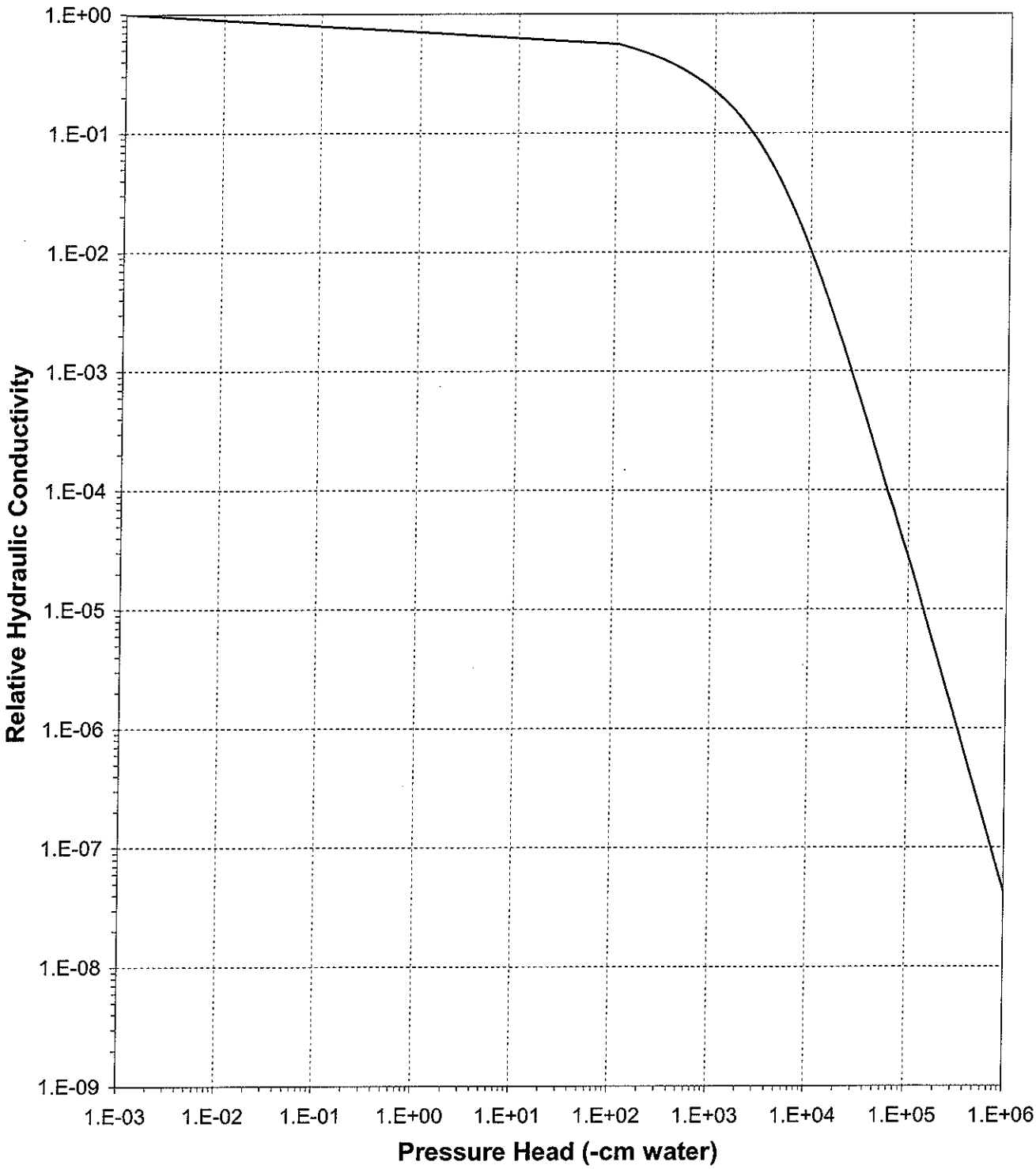
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-03A-SG



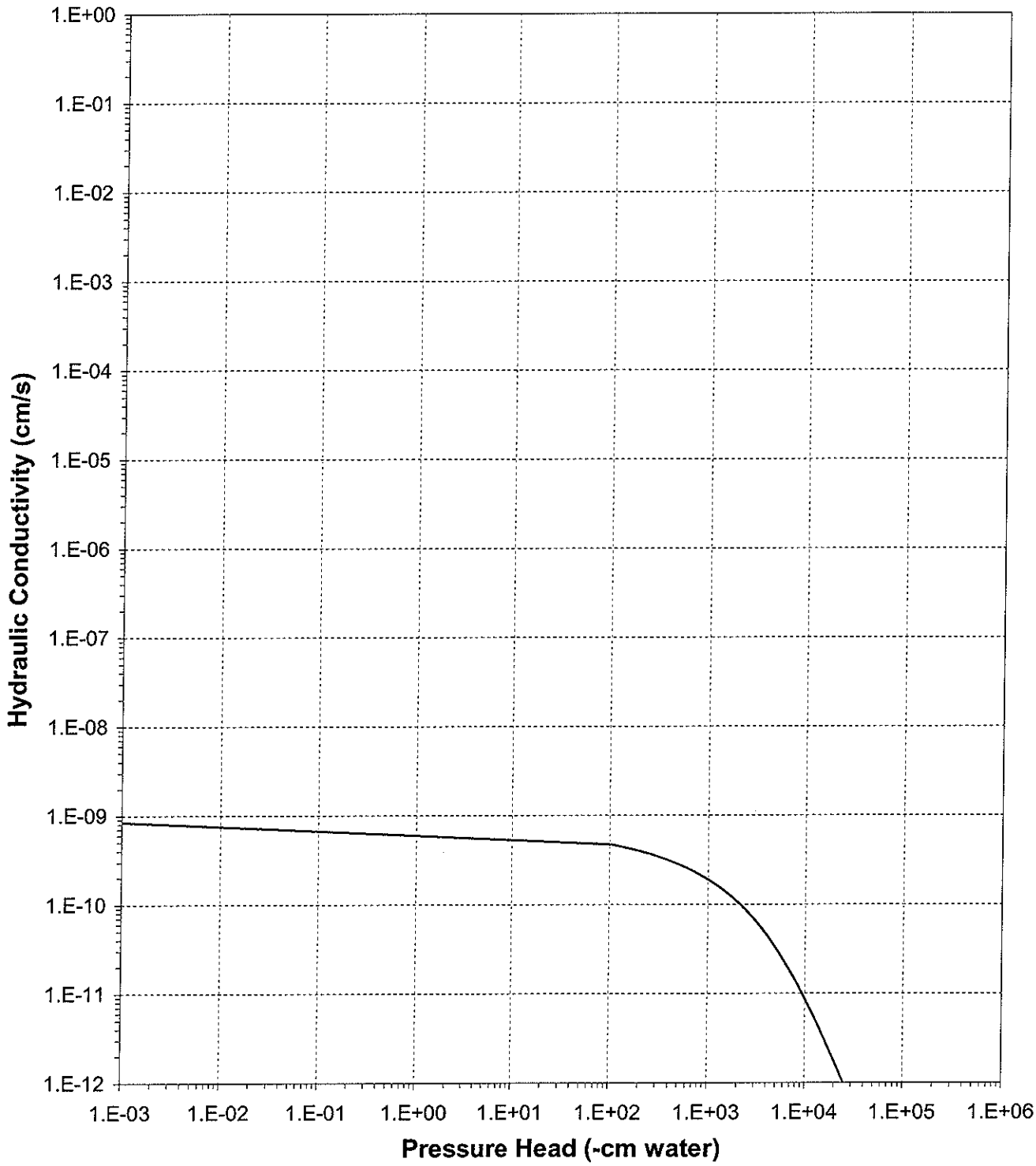
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-03A-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-03A-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03B-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 68.33
Tare wt., ring (g): 27.63
Tare wt., screen & clamp (g): 23.73
Initial sample volume (cm^3): 41.14
Initial dry bulk density (g/cm^3): 1.66
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 37.32

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Hanging column:	5-Nov-08	10:41	136.94	0.00	41.93
	11-Nov-08	11:15	135.99	50.50	39.62
Pressure plate:	24-Nov-08	9:05	133.22	611.88	32.89
	8-Dec-08	10:20	132.95	1529.70	32.23

Volume Adjusted Data[1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	50.50	---	---	---	---
Pressure plate:	611.88	---	---	---	---
	1529.70	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: A. Barraza/ K. Wright/ D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-LEP-03B-SG

Dry weight of dew point potentiometer sample* (g): 143.18
Tare weight, jar (g): 116.15
Initial sample bulk density (g/cm^3): 1.66

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)
Dew point potentiometer:	23-Oct-08	13:35	145.19	79340.4	12.30
	27-Oct-08	8:43	144.73	184583.8	9.51

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	79340.4	---	---	---	---
	184583.8	---	---	---	---

Dry weight of relative humidity box sample* (g): 73.75
Tare weight (g): 41.72
Initial sample bulk density (g/cm^3): 1.66

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)
Relative humidity box:	27-Oct-08	9:00	74.50	851293	3.88

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

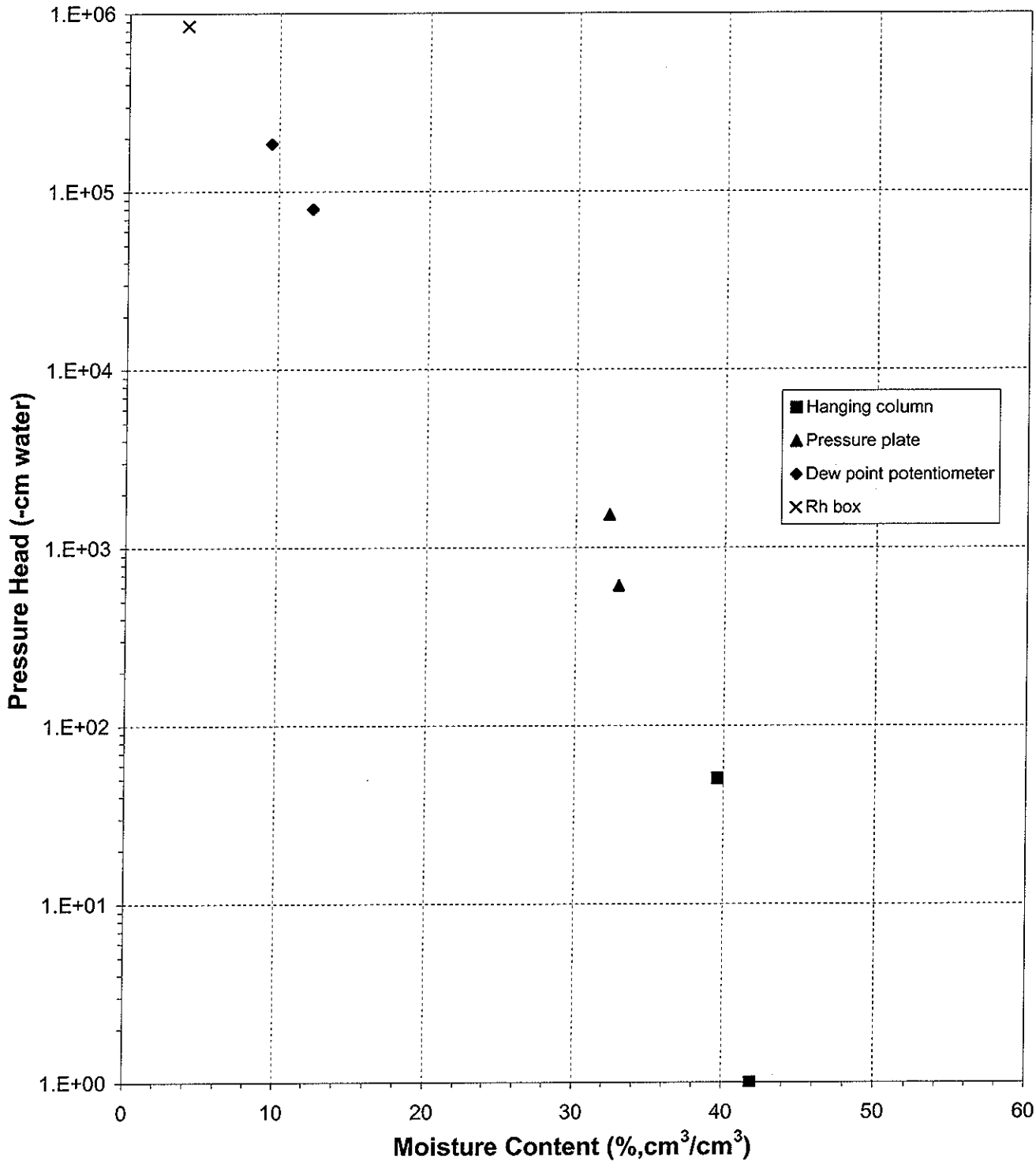
† Assumed density of water is 1.0 g/cm^3

Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: K. Mullen/T. MendezK. Mullen/T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

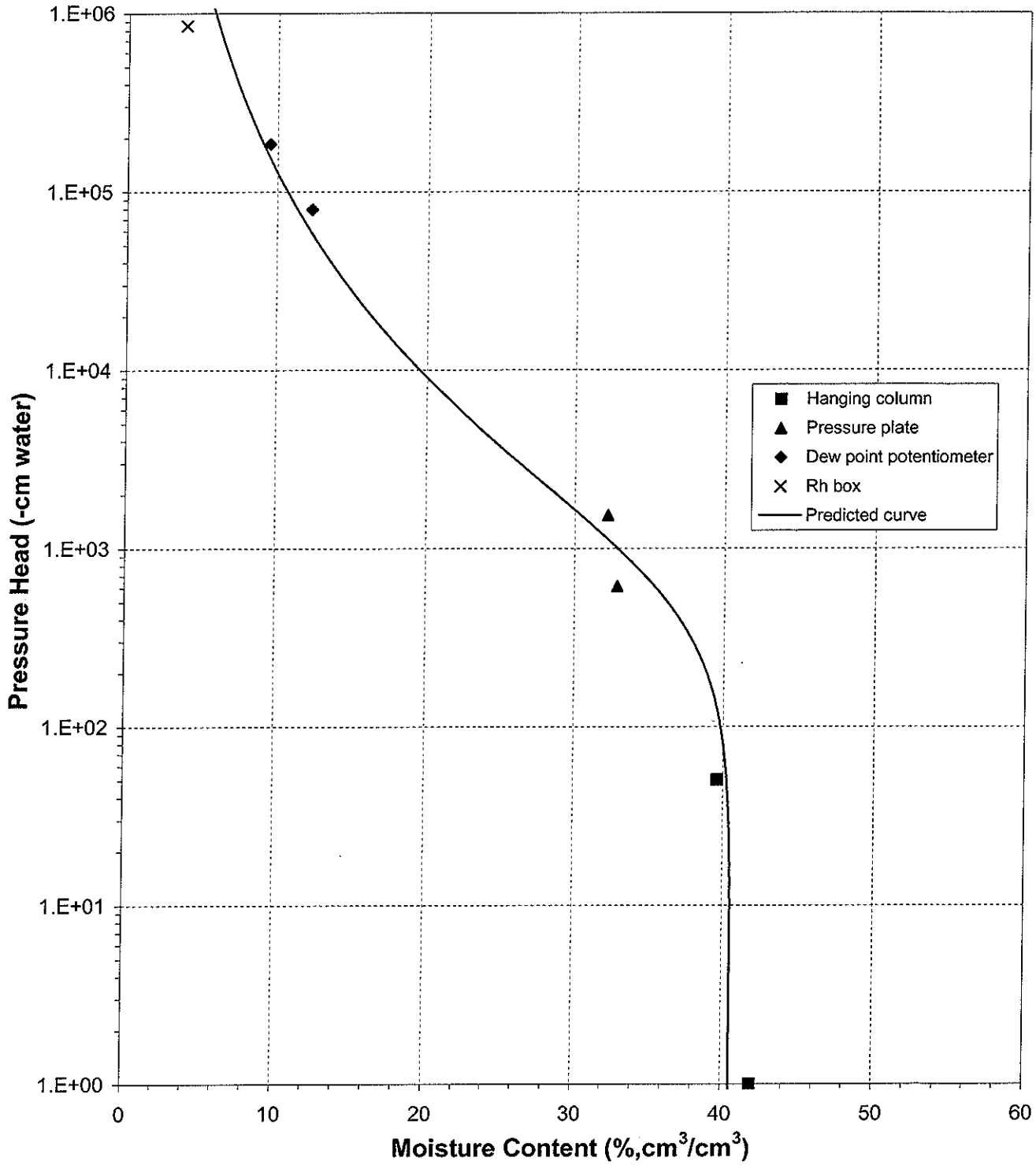
Water Retention Data Points

Sample Number: OU4-LEP-03B-SG



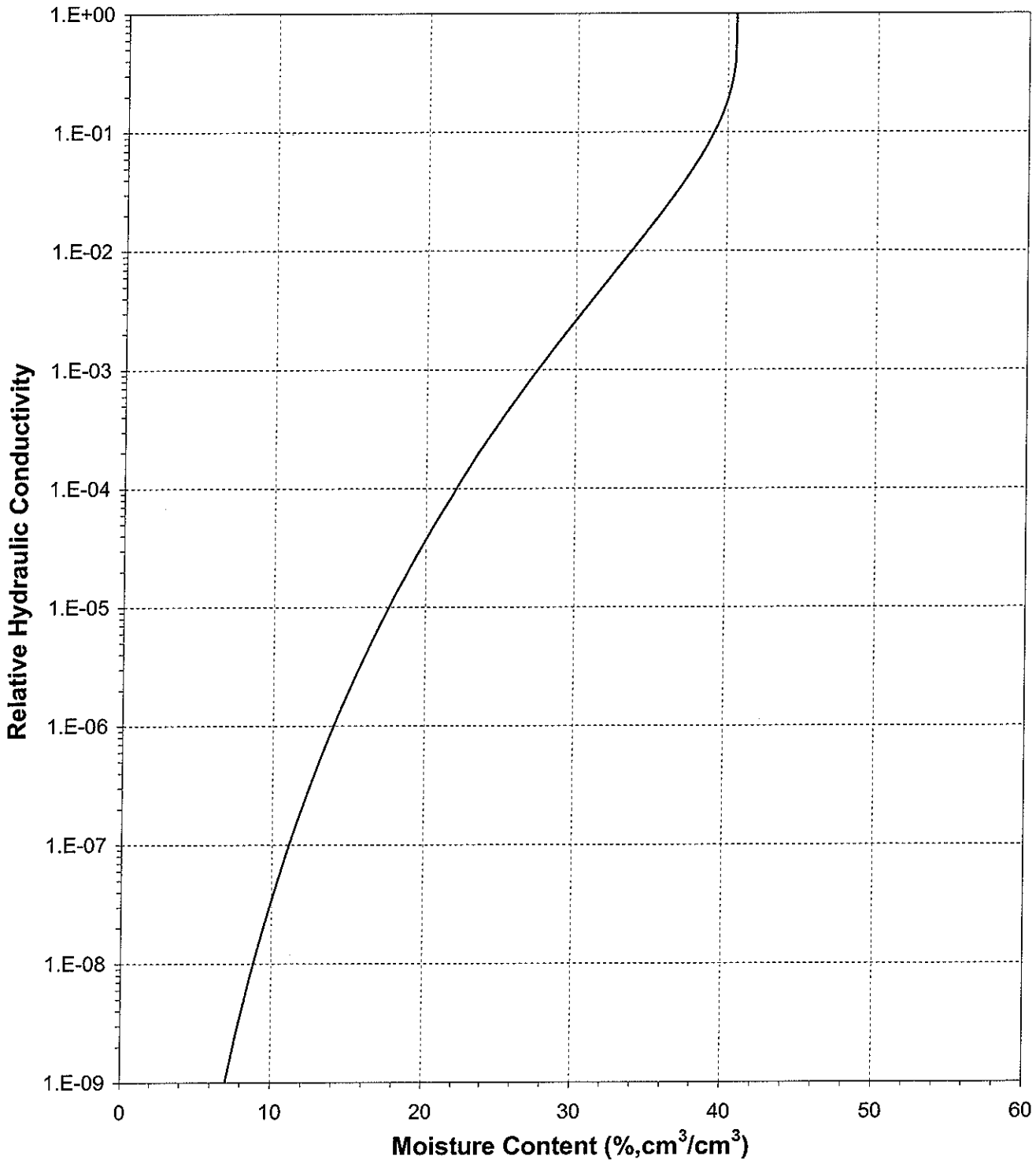
Predicted Water Retention Curve and Data Points

Sample Number: OU4-LEP-03B-SG



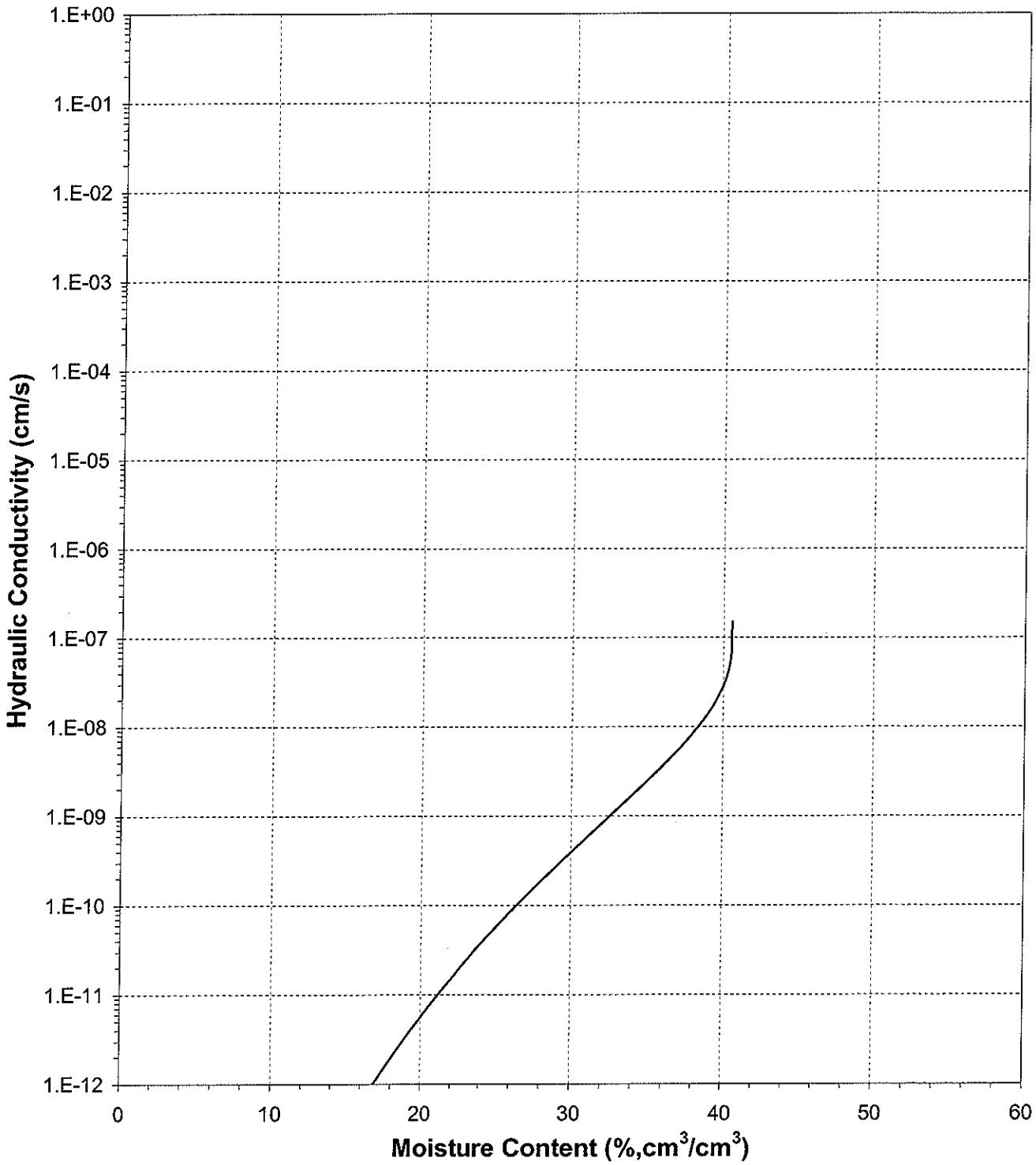
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-03B-SG



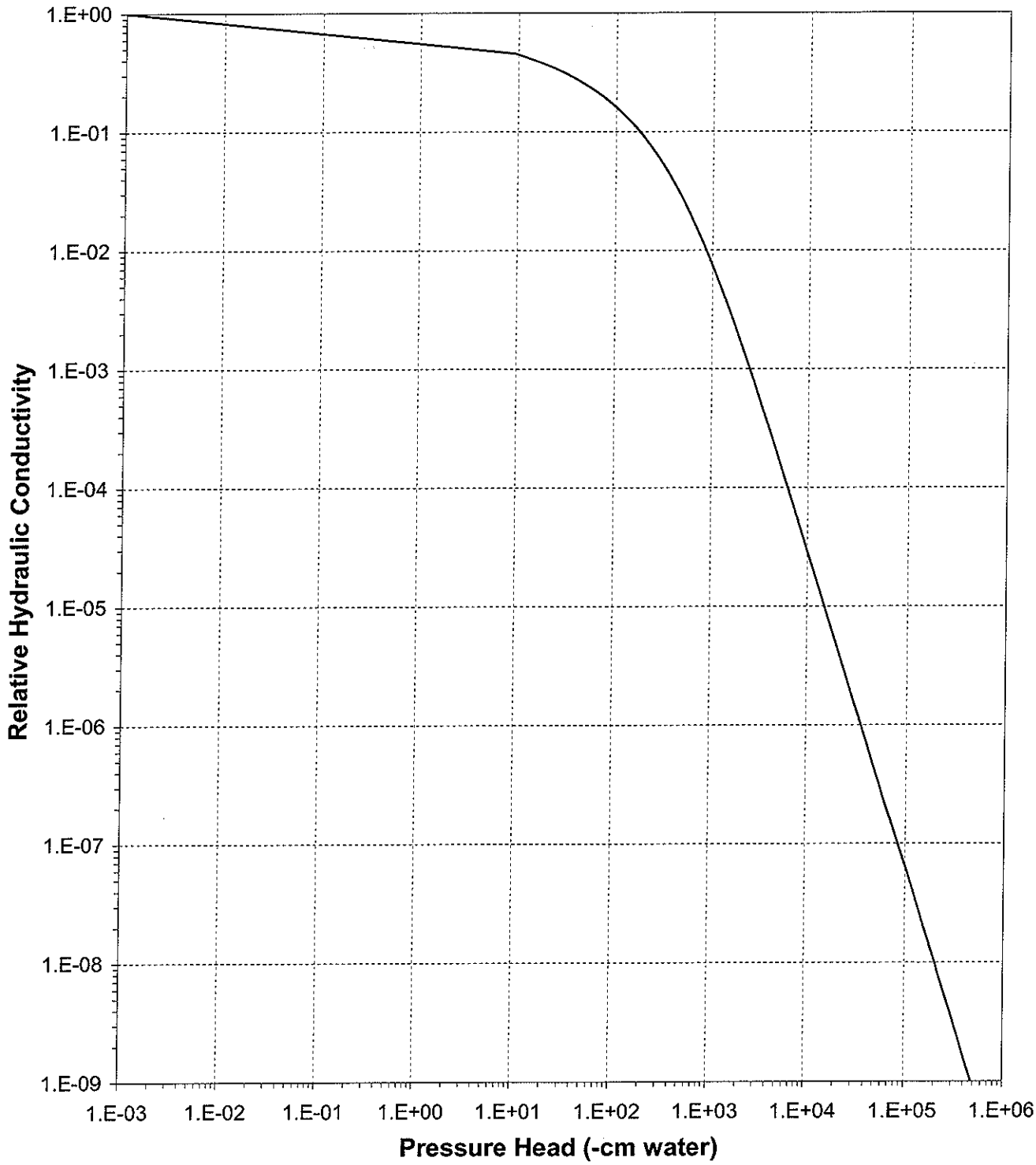
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-03B-SG



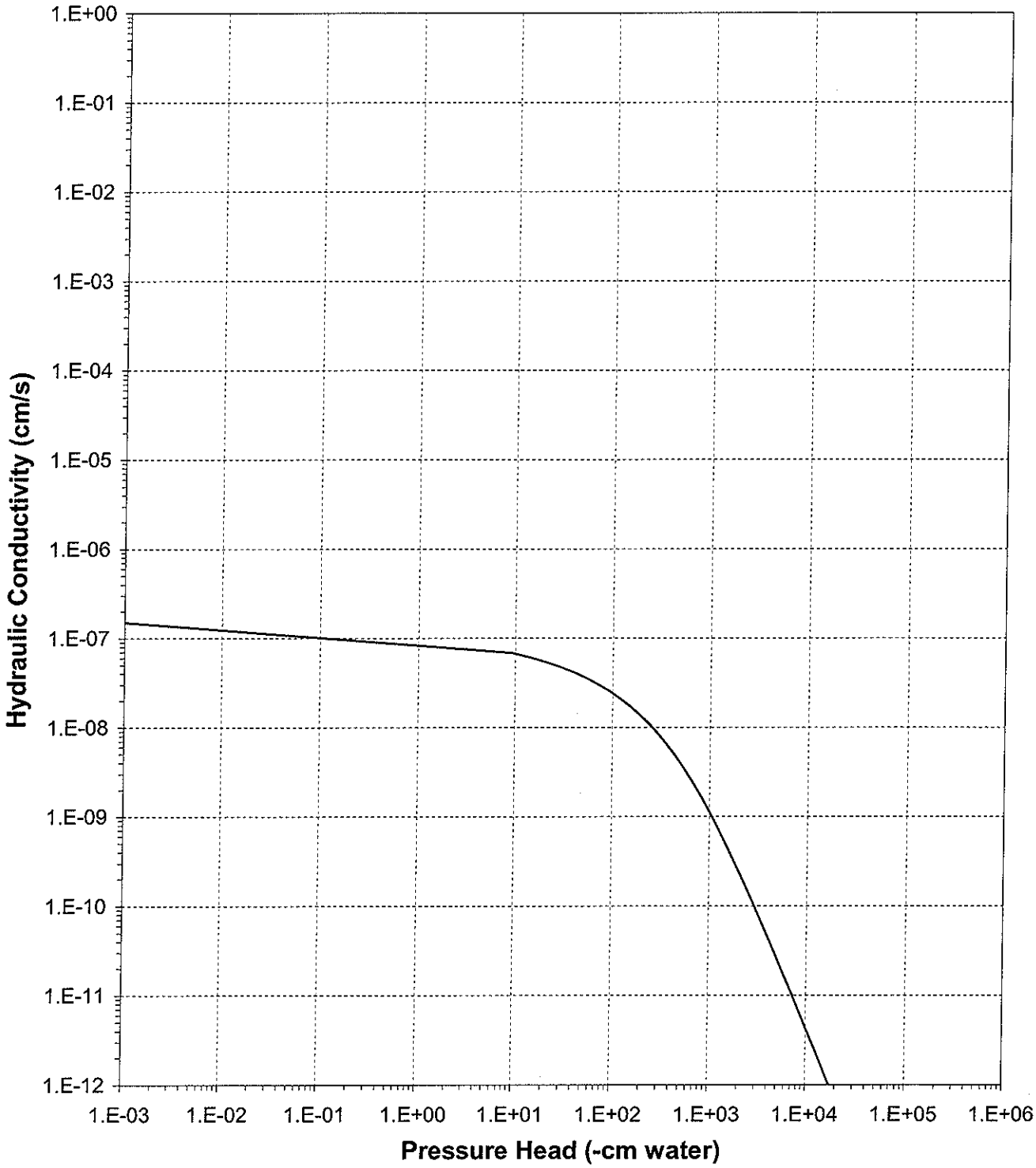
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-03B-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-03B-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05A-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 75.44
Tare wt., ring (g): 37.85
Tare wt., screen & clamp (g): 22.38
Initial sample volume (cm^3): 48.21
Initial dry bulk density (g/cm^3): 1.56
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 40.94

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)	
Hanging column:	11-Nov-08	10:10	157.06	0.00	43.47	⌗
	17-Nov-08	11:30	158.28	51.50	44.80	⌗
	24-Nov-08	9:55	158.24	155.00	44.93	⌗
Pressure plate:	8-Dec-08	12:55	157.02	336.53	43.10	⌗
	22-Dec-08	15:30	156.96	1478.71	43.25	⌗

Volume Adjusted Data[1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	49.20	+2.06%	1.53	42.14
	51.50	50.47	+4.69%	1.49	43.59
	155.00	50.24	+4.22%	1.50	43.33
Pressure plate:	336.53	49.54	+2.76%	1.52	42.53
	1478.71	49.22	+2.11%	1.53	42.16

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '—' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

⌗ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: D. O'Dowd/ R. Marshall
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-LEP-05A-SG

Dry weight of dew point potentiometer sample* (g): 3.98
Tare weight, jar (g): 3.23
Initial sample bulk density (g/cm^3): 1.56

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)	
Dew point potentiometer:	30-Dec-08	12:15	4.02	283504.4	8.37	‡‡

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	283504.4	49.22	+2.11%	1.53	42.16

Dry weight of relative humidity box sample* (g): 60.15
Tare weight (g): 37.72
Initial sample bulk density (g/cm^3): 1.56

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)	
Relative humidity box:	27-Oct-08	8:35	60.92	851293	5.22	‡‡

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	49.22	+2.11%	1.53	42.16

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

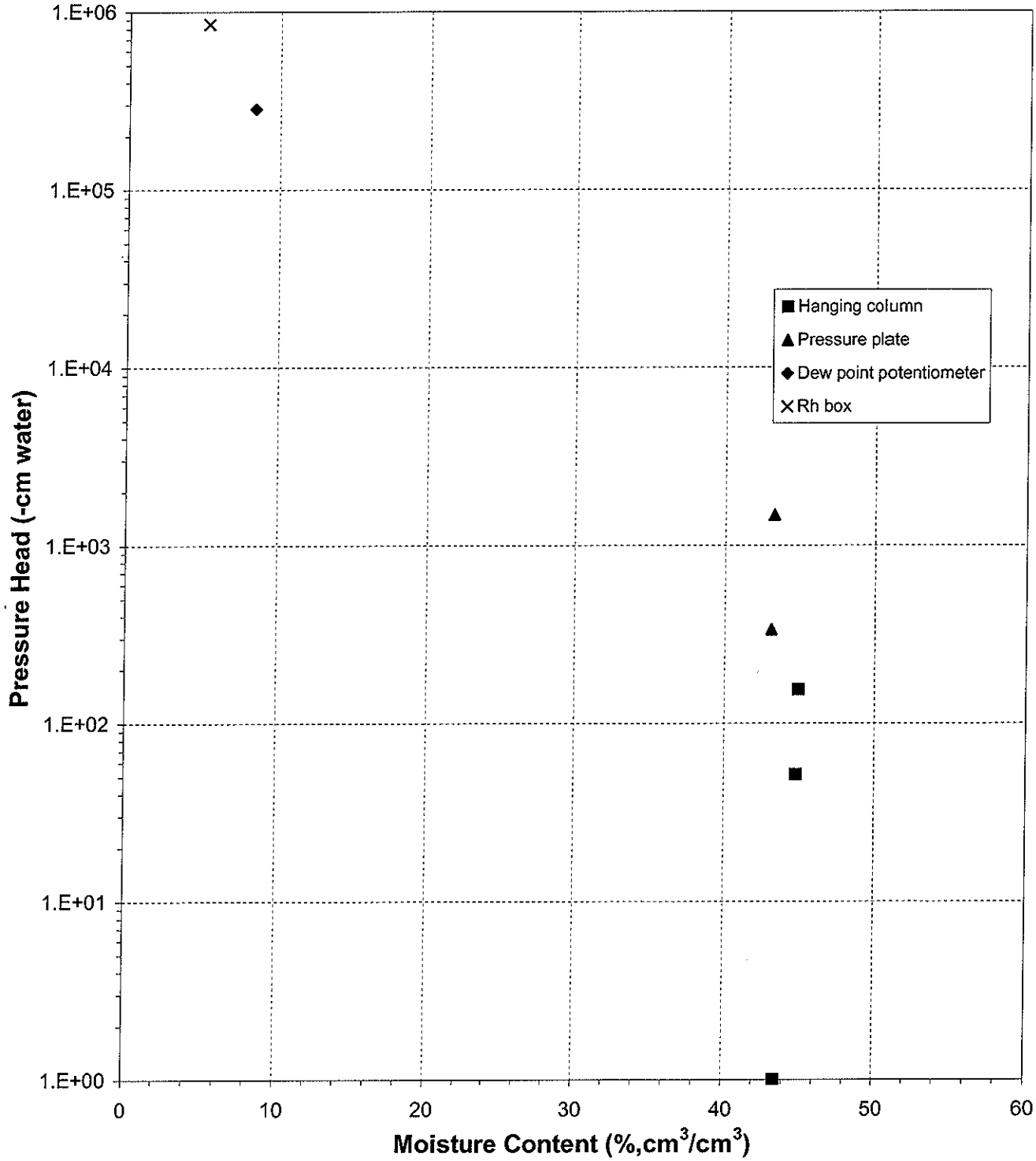
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: K. Mullen/R. Marshall/K. Mullen/T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

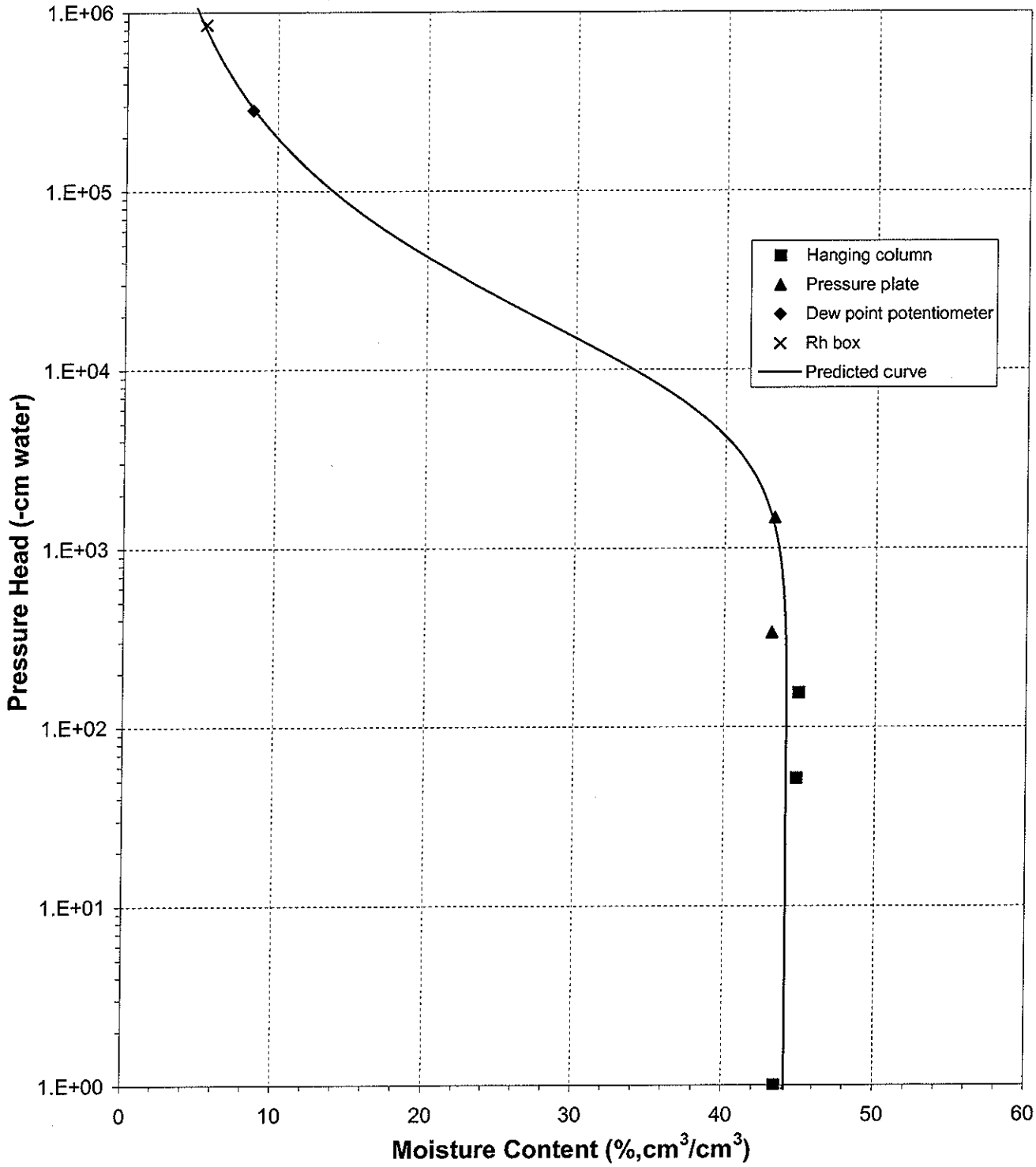
Water Retention Data Points

Sample Number: OU4-LEP-05A-SG



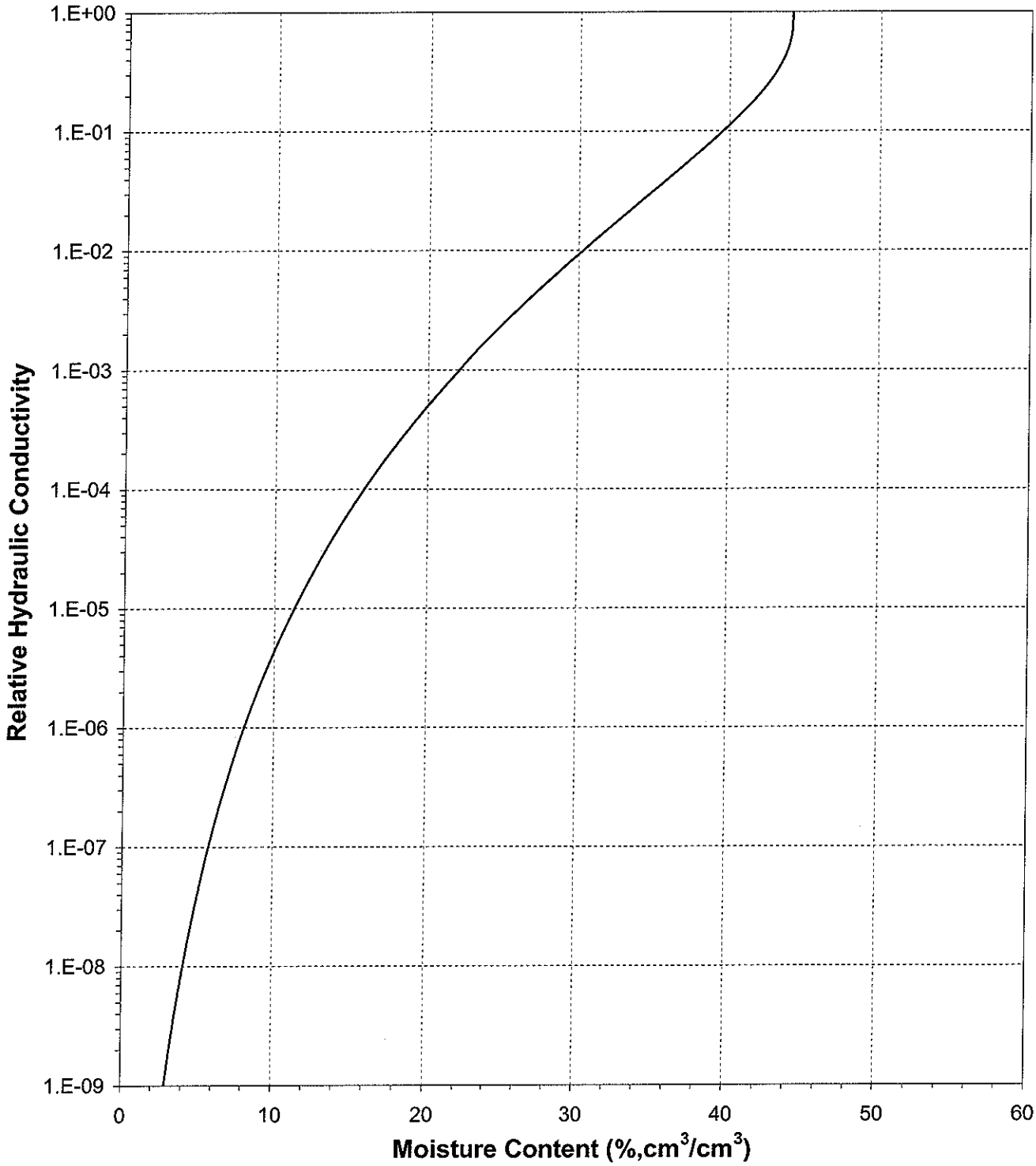
Predicted Water Retention Curve and Data Points

Sample Number: OU4-LEP-05A-SG



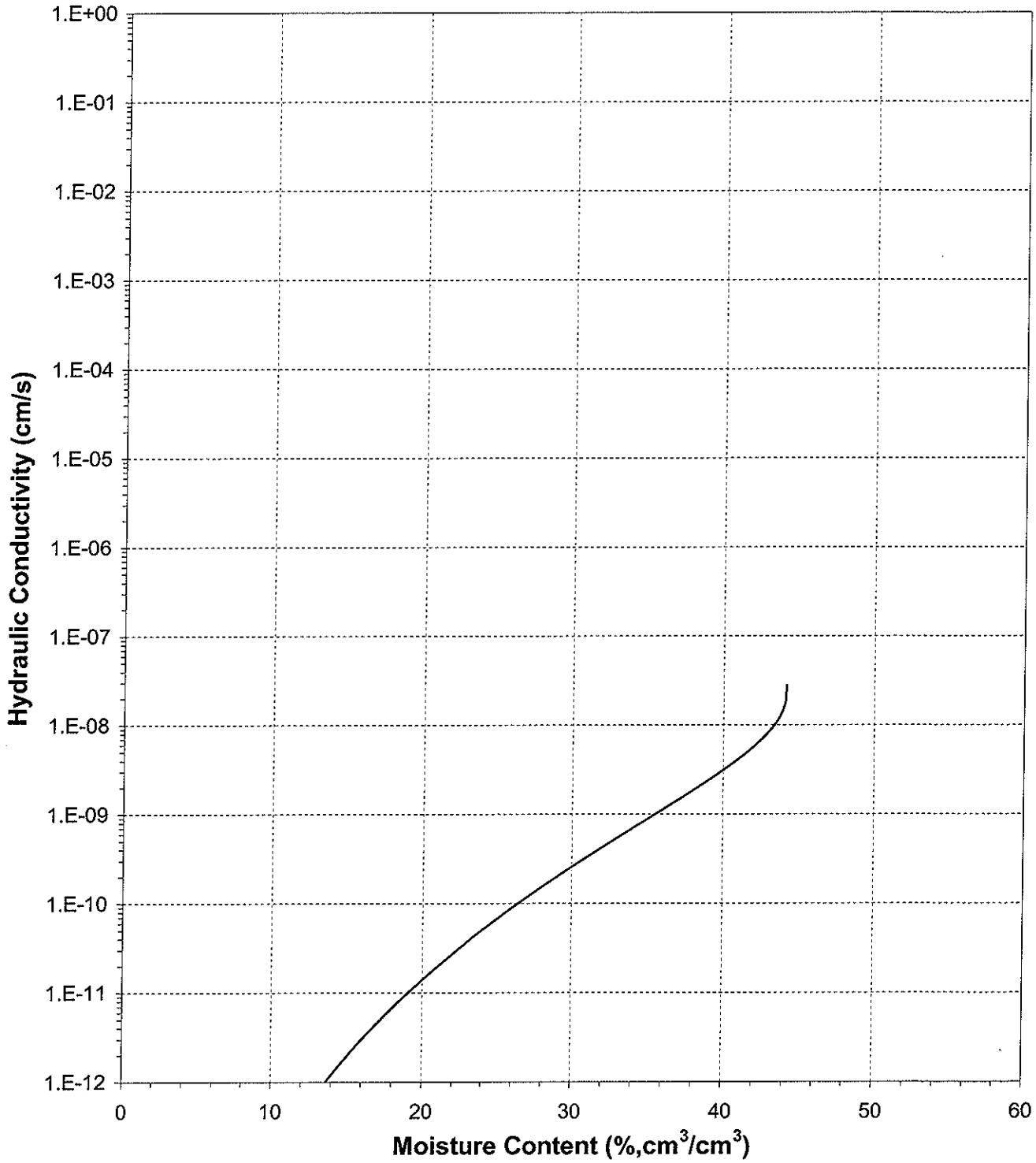
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-05A-SG



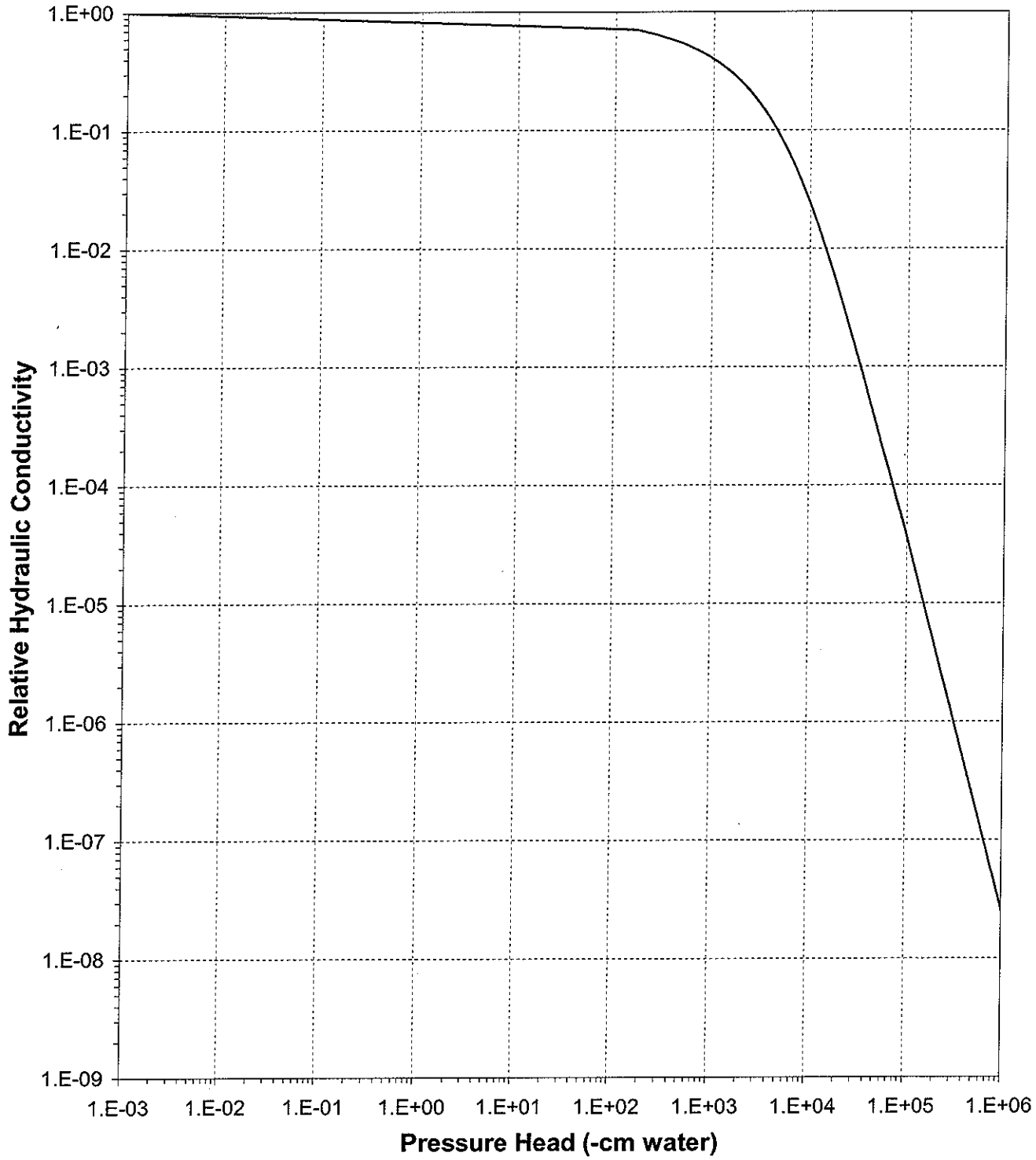
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-05A-SG



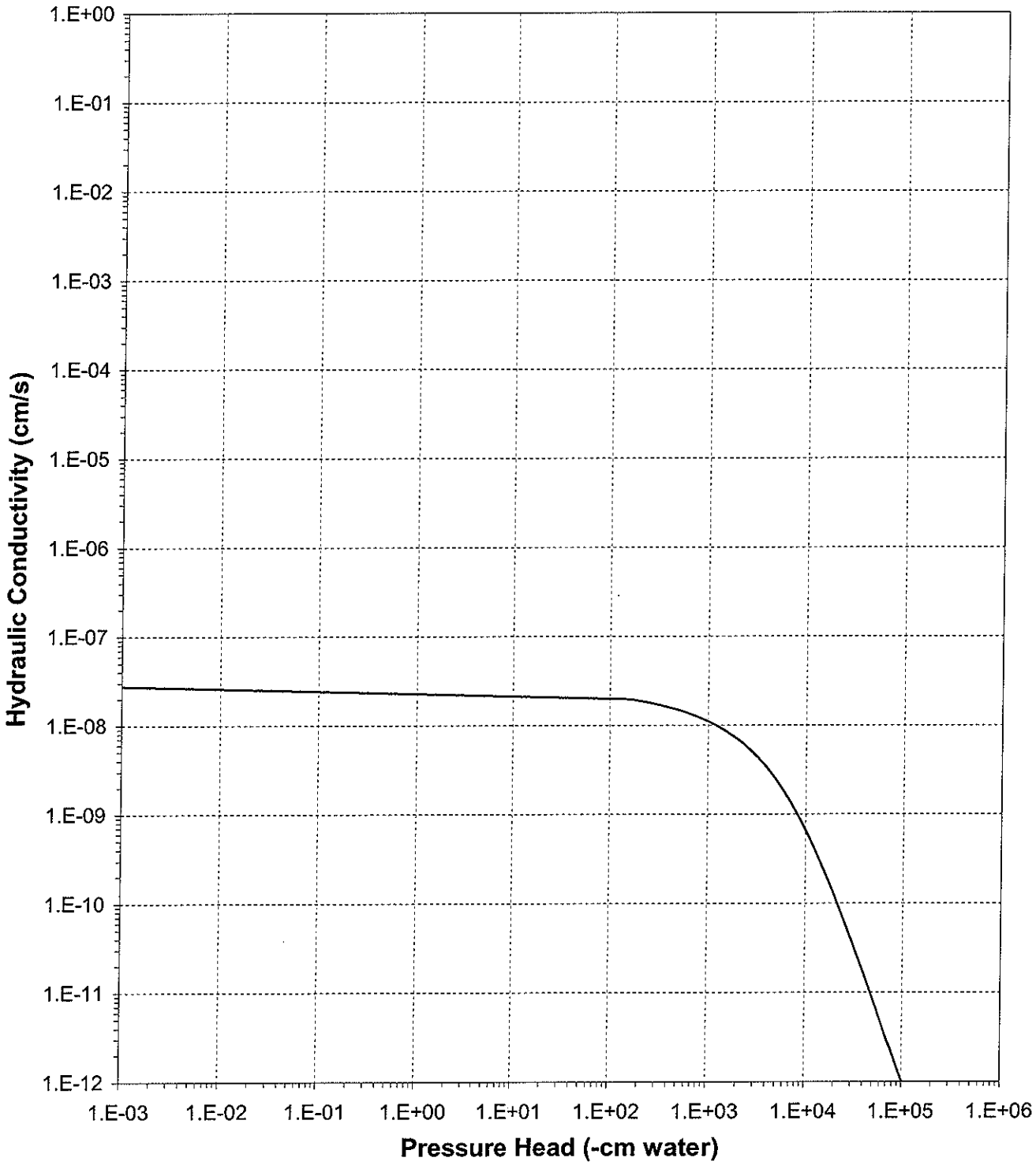
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-05A-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-05A-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05B-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 67.56
Tare wt., ring (g): 31.10
Tare wt., screen & clamp (g): 27.22
Initial sample volume (cm^3): 45.53
Initial dry bulk density (g/cm^3): 1.48
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 44.00

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)	
Hanging column:	11-Nov-08	15:30	147.23	0.00	46.89	
	17-Nov-08	11:37	147.69	54.50	46.48	⌗
	24-Nov-08	9:30	147.46	154.00	46.42	⌗
Pressure plate:	8-Dec-08	12:50	146.67	336.53	44.72	⌗
	22-Dec-08	15:29	146.44	1478.71	44.23	⌗

Volume Adjusted Data[1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	54.50	46.93	+3.07%	1.44	45.67
	154.00	46.48	+2.10%	1.45	45.16
Pressure plate:	336.53	46.48	+2.10%	1.45	45.16
	1478.71	46.48	+2.10%	1.45	45.16

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

⌗ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: D. O'Dowd/ R. Marshall
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-LEP-05B-SG

Dry weight of dew point potentiometer sample* (g): 139.33
Tare weight, jar (g): 112.94
Initial sample bulk density (g/cm^3): 1.48

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)	
Dew point potentiometer:	22-Oct-08	13:12	142.07	74751.3	15.07	##
	22-Oct-08	9:35	141.11	249851.0	9.83	##

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	74751.3	46.48	+2.10%	1.45	45.16
	249851.0	46.48	+2.10%	1.45	45.16

Dry weight of relative humidity box sample* (g): 68.80
Tare weight (g): 42.29
Initial sample bulk density (g/cm^3): 1.48

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)	
Relative humidity box:	27-Oct-08	8:38	69.61	851293	4.43	##

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	46.48	+2.10%	1.45	45.16

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

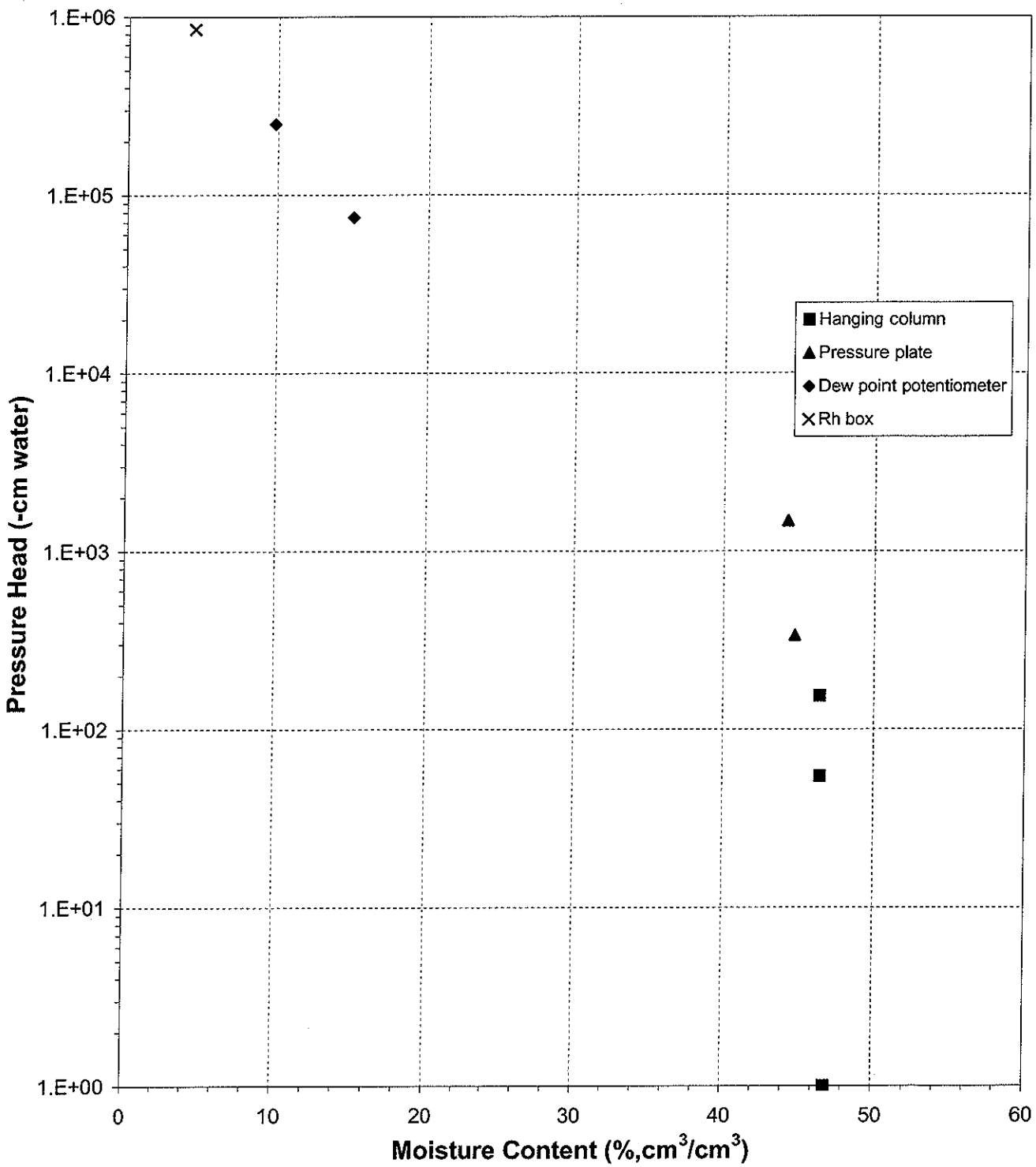
† Assumed density of water is 1.0 g/cm^3

Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: K. Mullen/T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

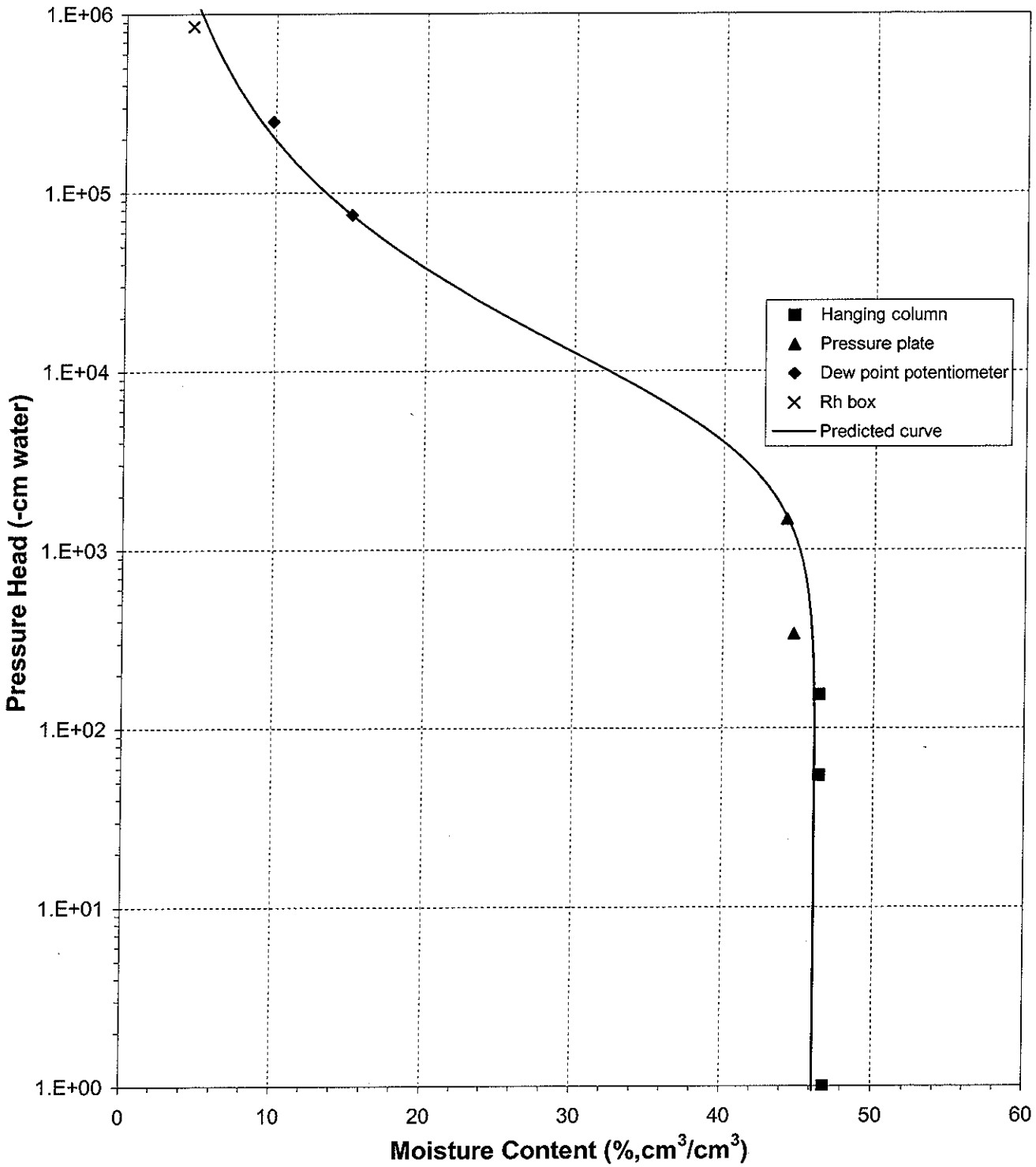
Water Retention Data Points

Sample Number: OU4-LEP-05B-SG



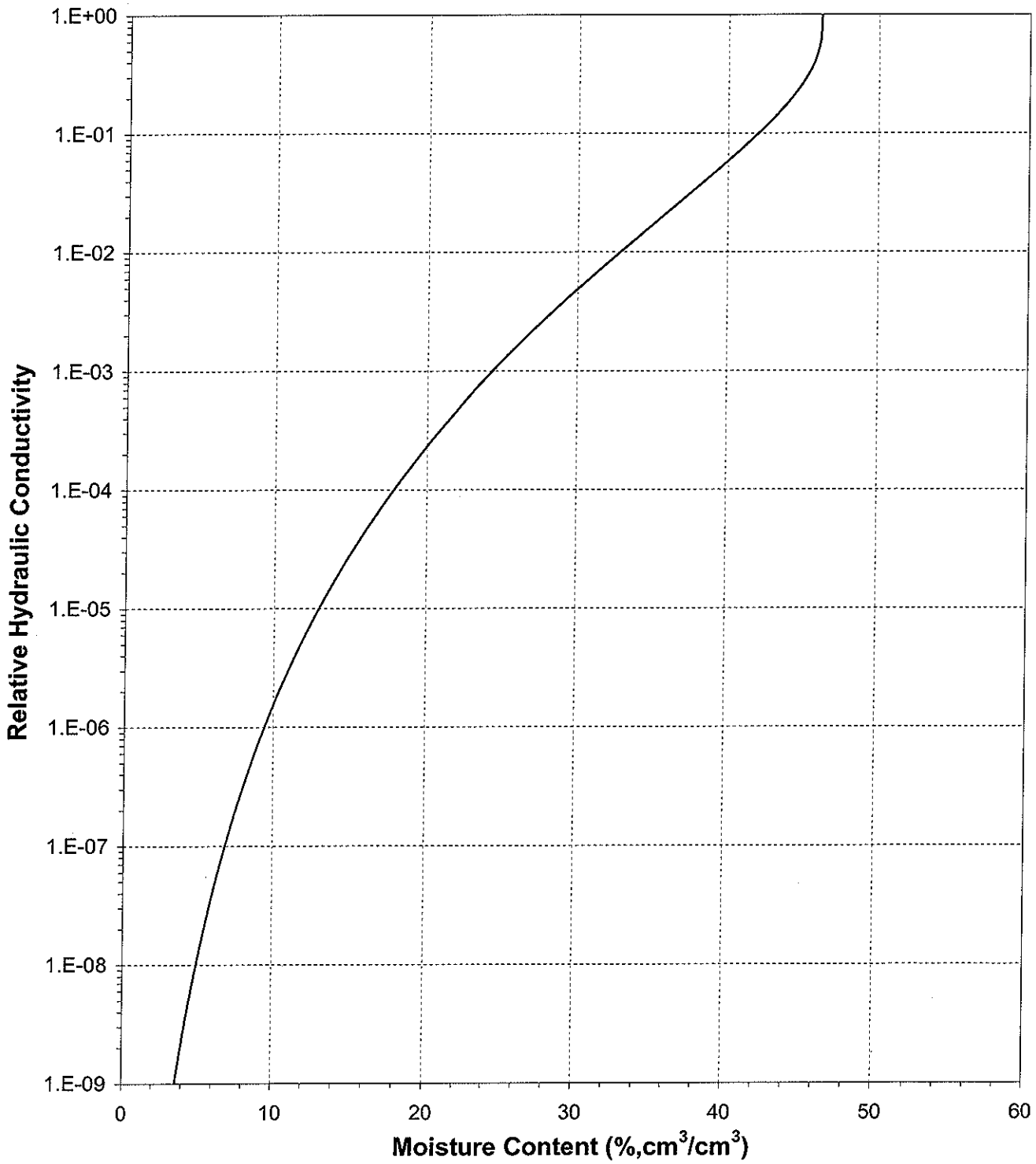
Predicted Water Retention Curve and Data Points

Sample Number: OU4-LEP-05B-SG



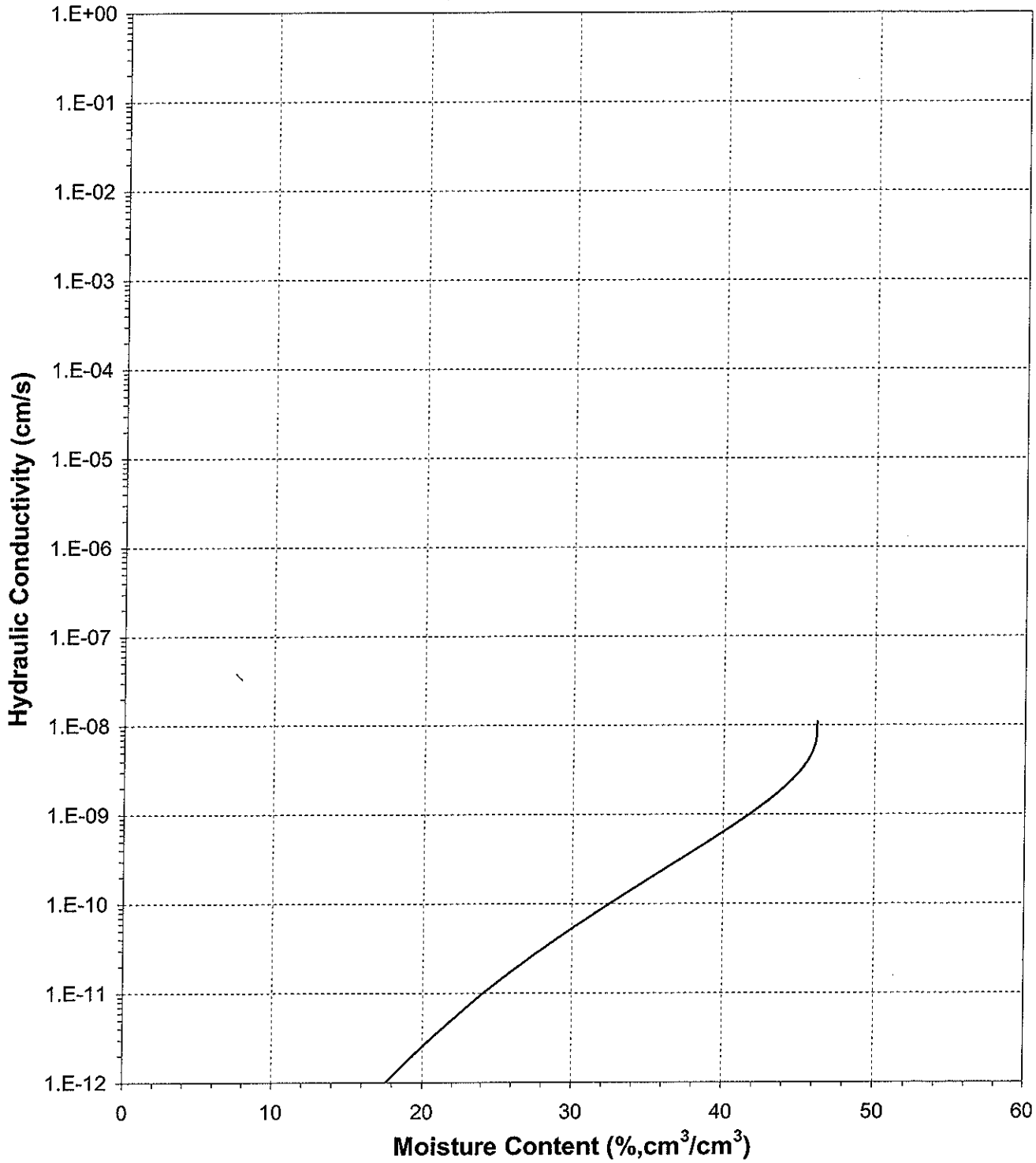
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-05B-SG



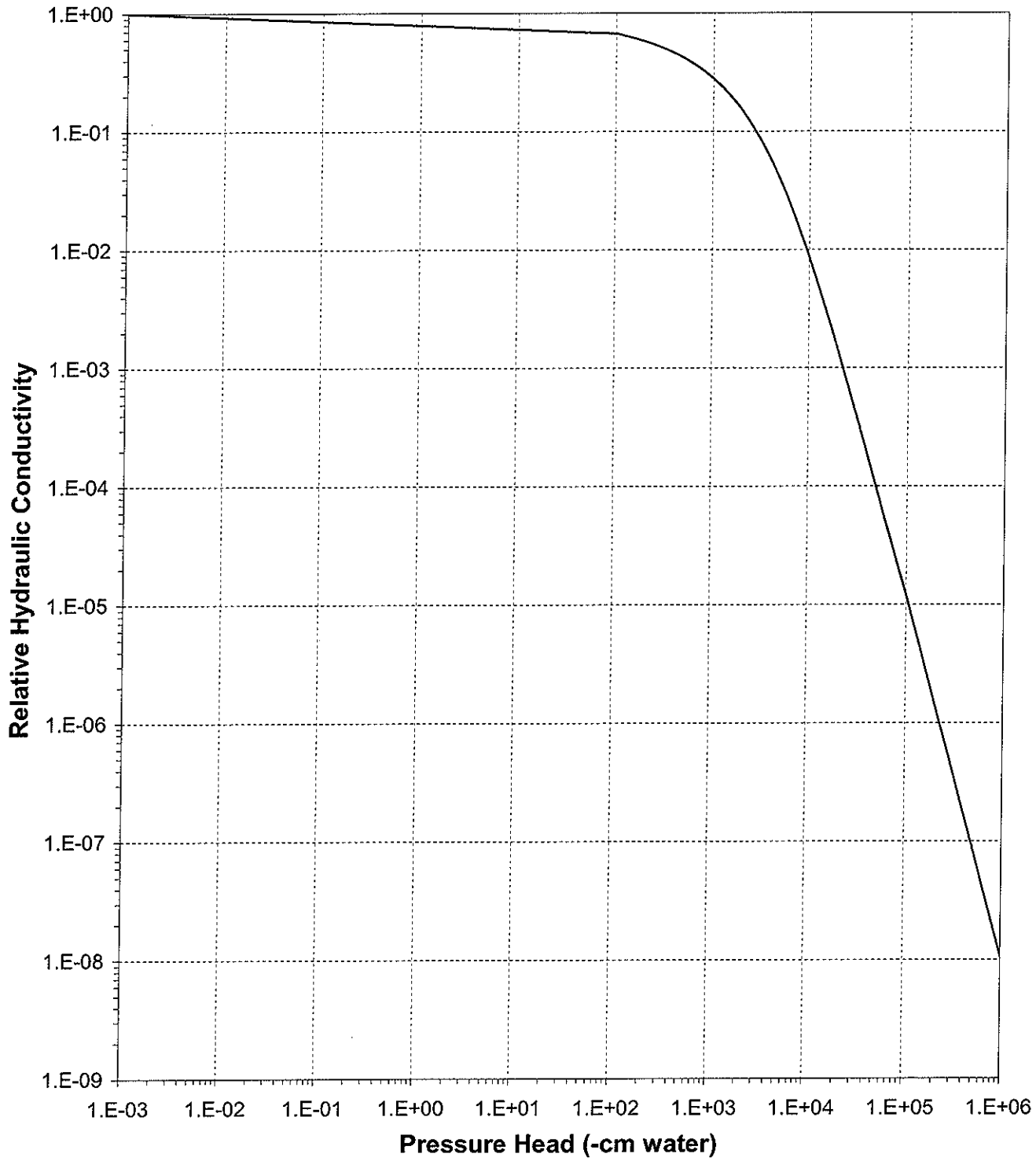
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-05B-SG



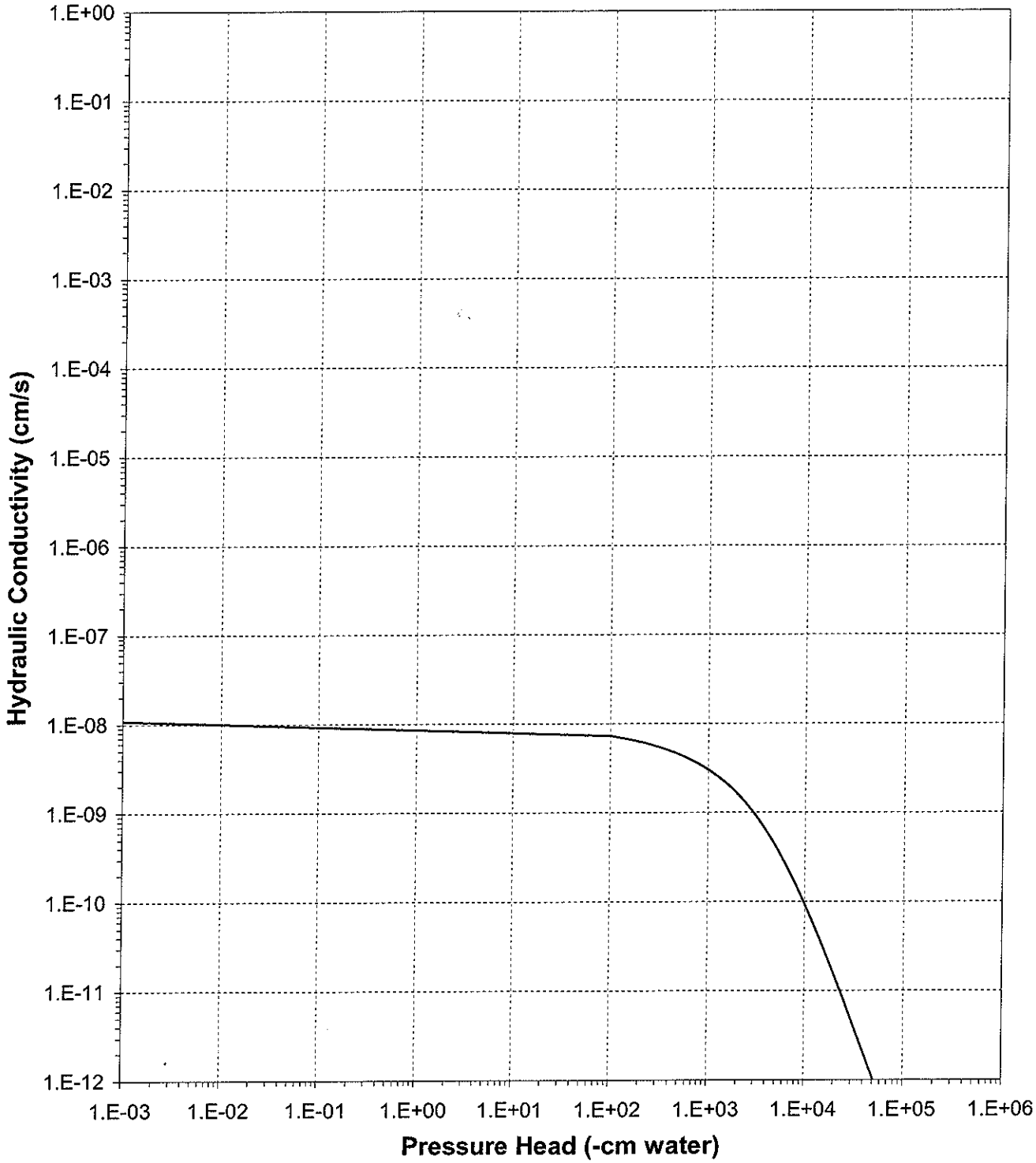
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-05B-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-05B-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07A-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 67.16
Tare wt., ring (g): 36.18
Tare wt., screen & clamp (g): 22.51
Initial sample volume (cm^3): 45.07
Initial dry bulk density (g/cm^3): 1.49
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 43.77

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content † (% vol)
Hanging column:	30-Oct-08	11:40	146.79	0.00	46.46
	5-Nov-08	12:00	141.74	17.00	35.26
	12-Nov-08	10:15	139.03	31.00	29.24
	19-Nov-08	15:20	135.61	105.00	21.66
Pressure plate:	30-Nov-08	14:00	134.24	509.90	18.62

Volume Adjusted Data [1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	17.00	---	---	---	---
	31.00	---	---	---	---
	105.00	---	---	---	---
Pressure plate:	509.90	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: K. Wright/ R. Marshall
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-UEP-07A-SG

Dry weight of dew point potentiometer sample* (g): 136.46
Tare weight, jar (g): 116.50
Initial sample bulk density (g/cm^3): 1.49

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content † (% vol)
Dew point potentiometer:	24-Oct-08	10:55	137.50	74037.5	7.76
	22-Oct-08	10:09	137.33	219257.0	6.52

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	74037.5	---	---	---	---
	219257.0	---	---	---	---

Dry weight of relative humidity box sample* (g): 69.56
Tare weight (g): 36.51
Initial sample bulk density (g/cm^3): 1.49

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content † (% vol)
Relative humidity box:	27-Oct-08	9:00	70.22	851293	2.96

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

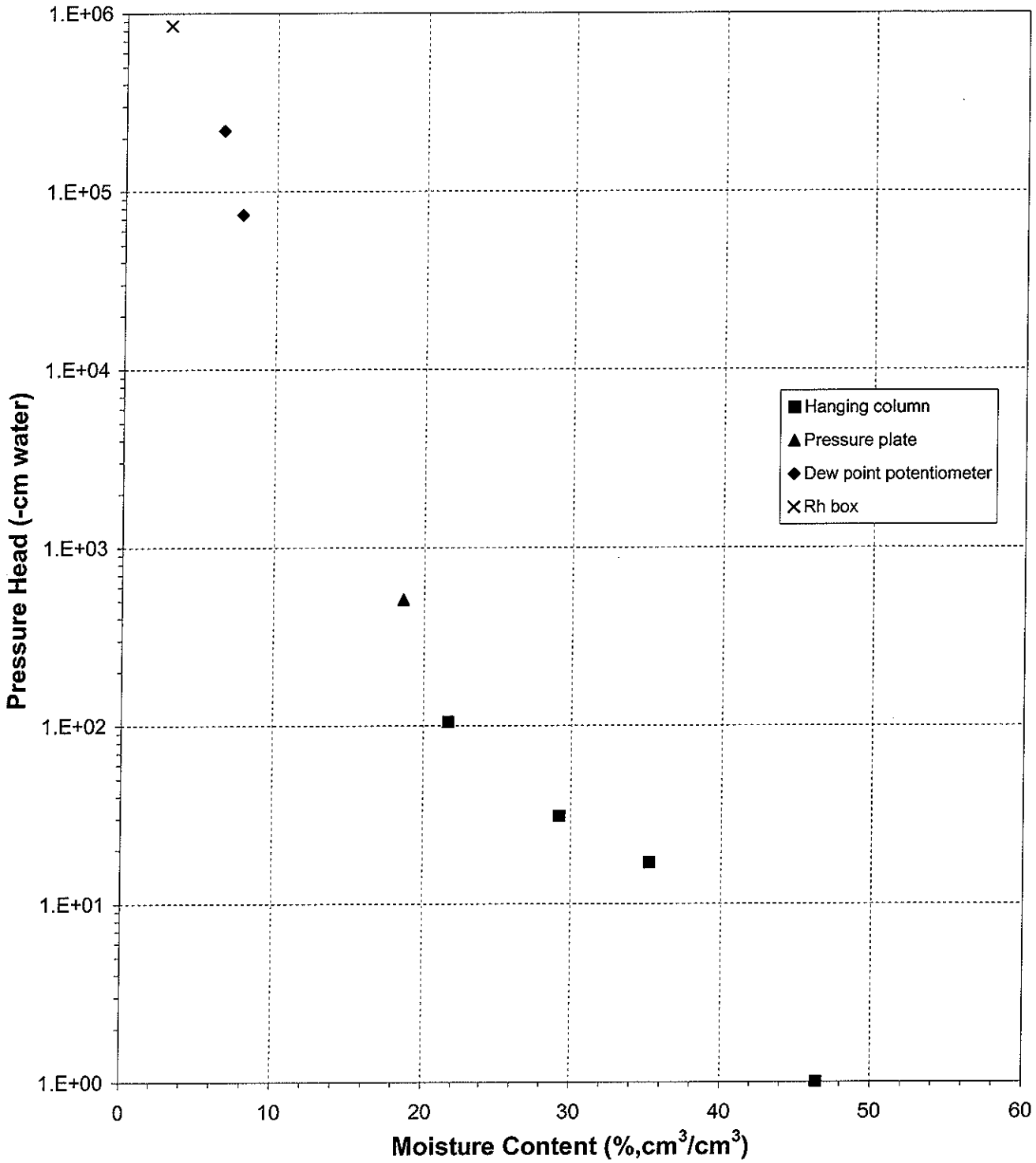
† Assumed density of water is 1.0 g/cm^3

‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: K. Mullen/K. Wright/T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

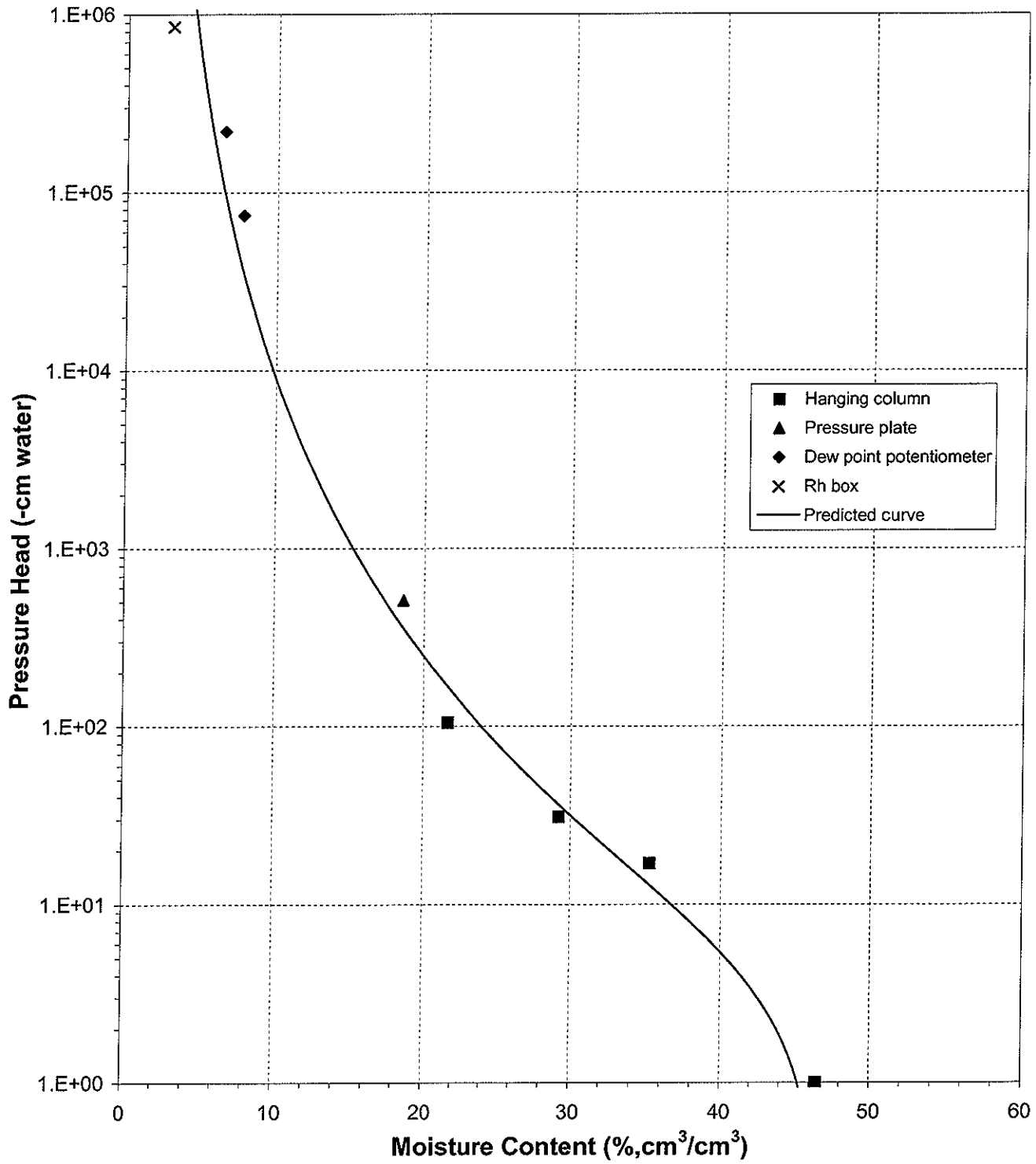
Water Retention Data Points

Sample Number: OU4-UEP-07A-SG



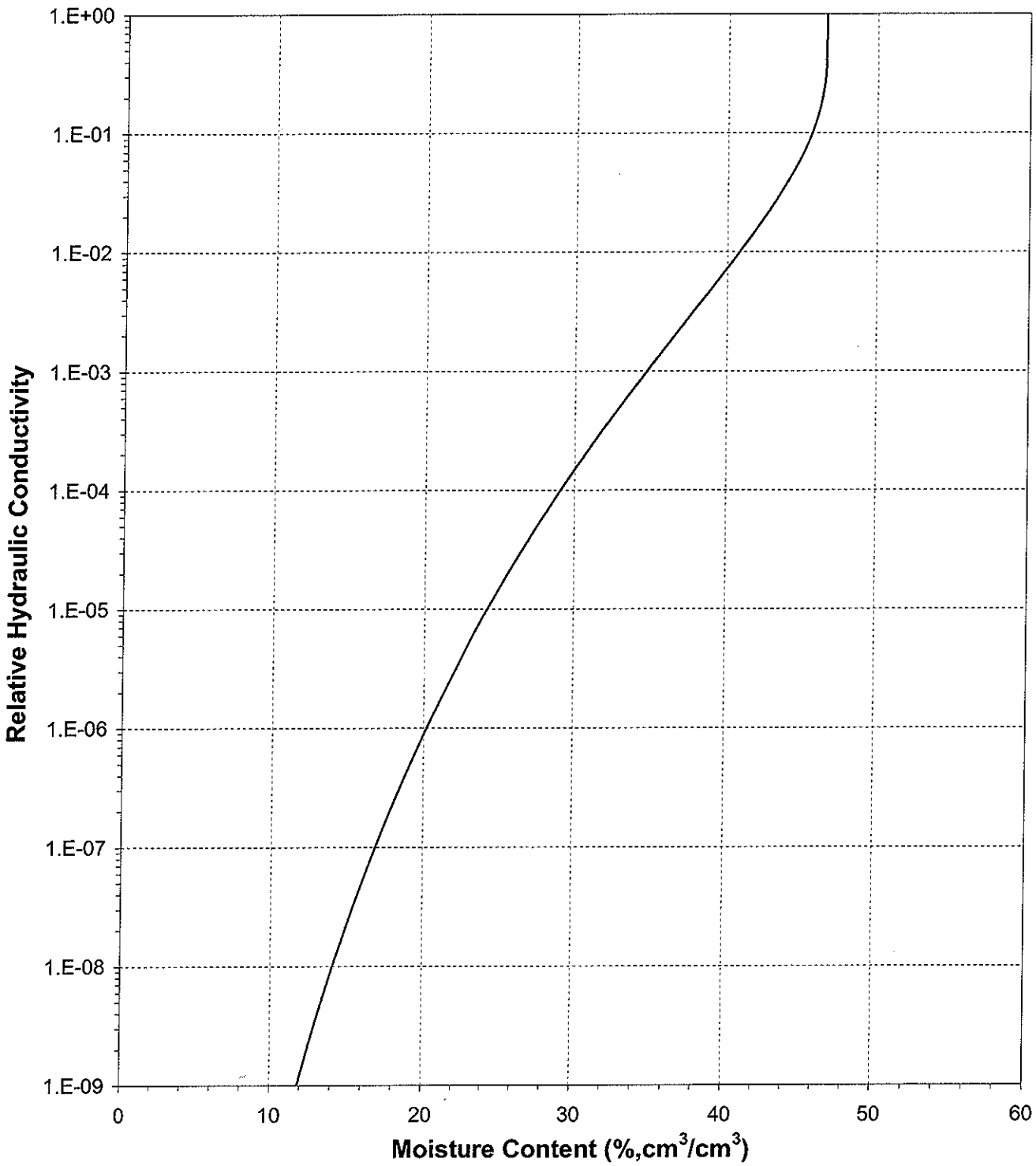
Predicted Water Retention Curve and Data Points

Sample Number: OU4-UEP-07A-SG



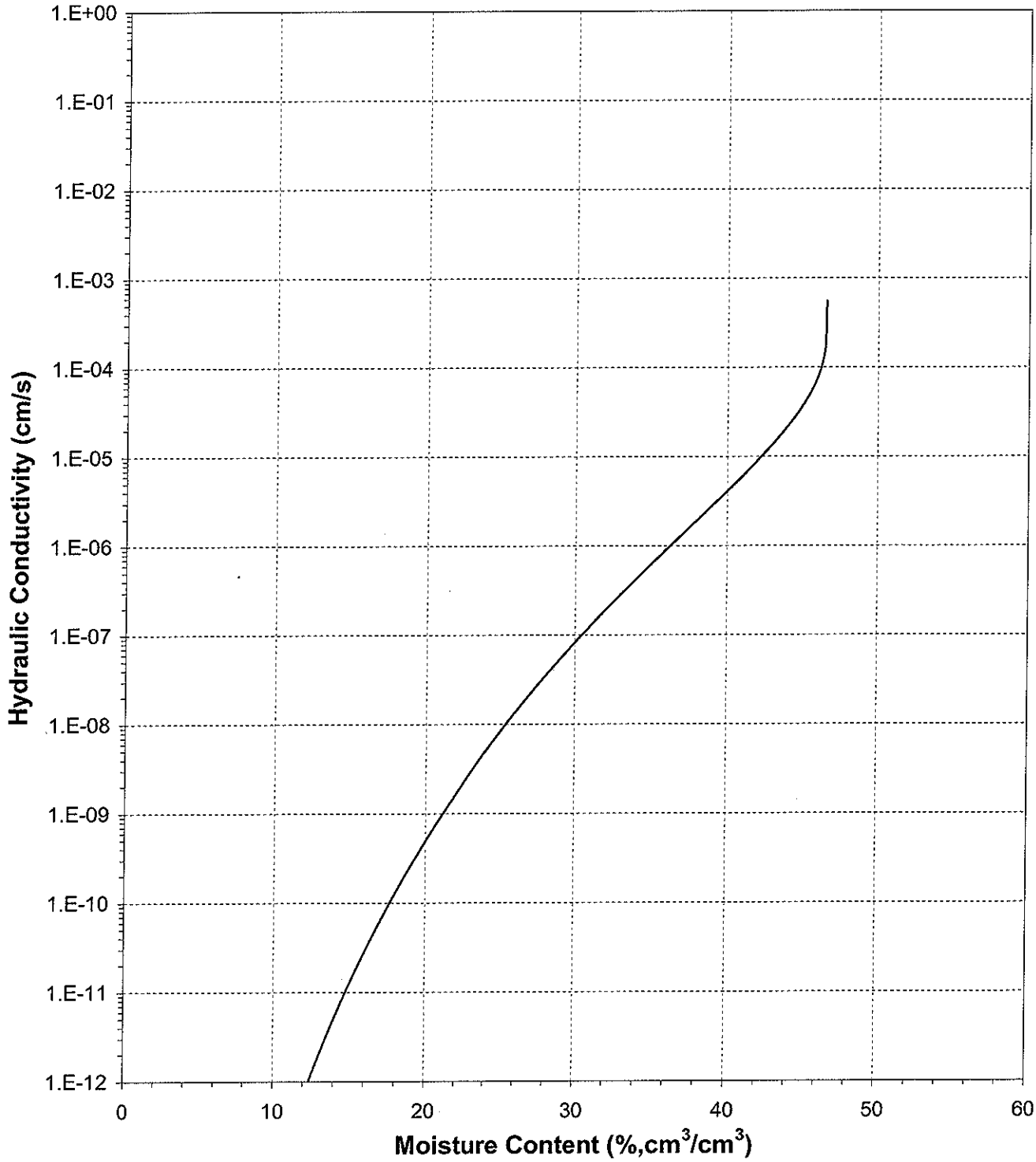
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-UEP-07A-SG



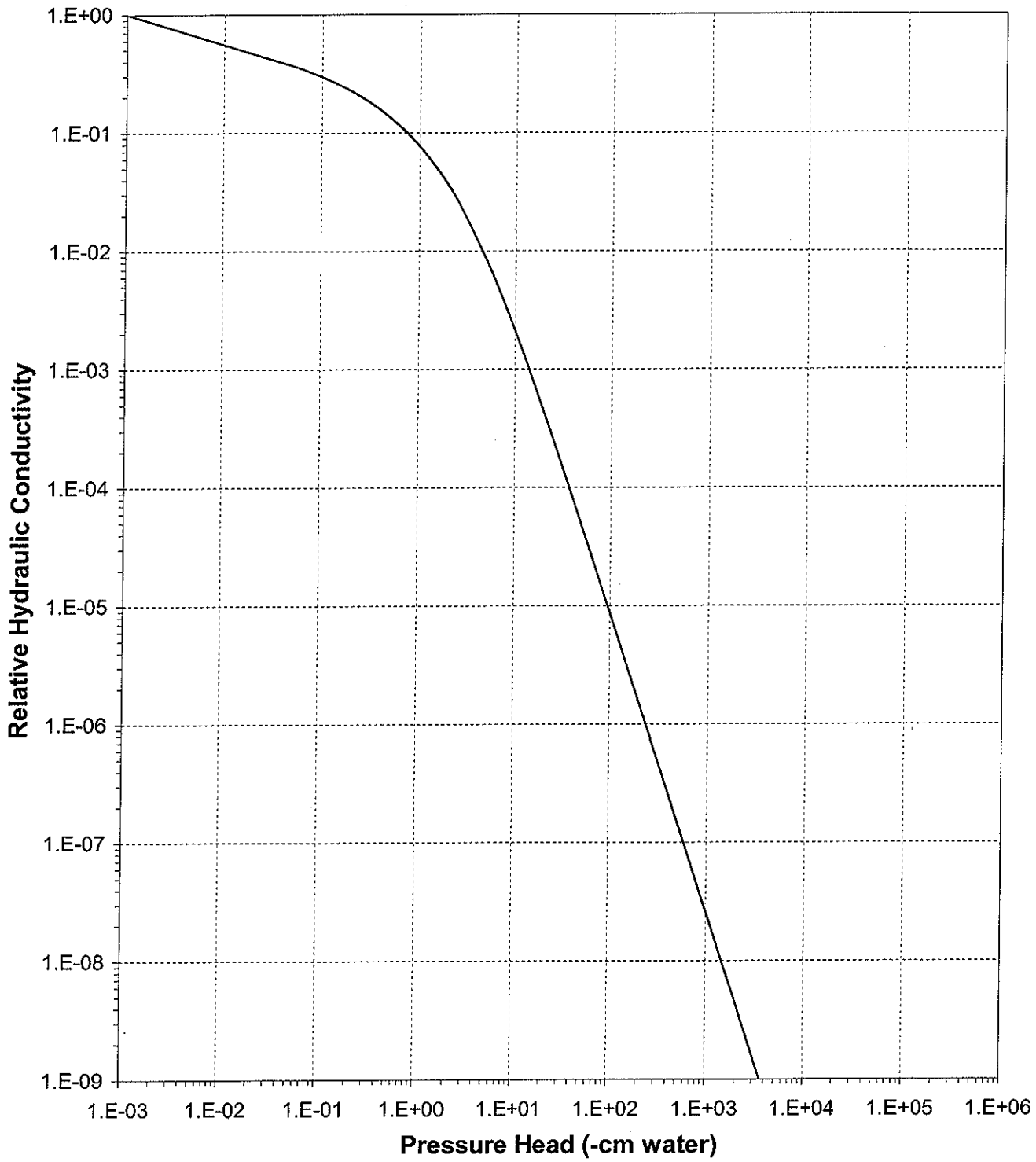
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-UEP-07A-SG



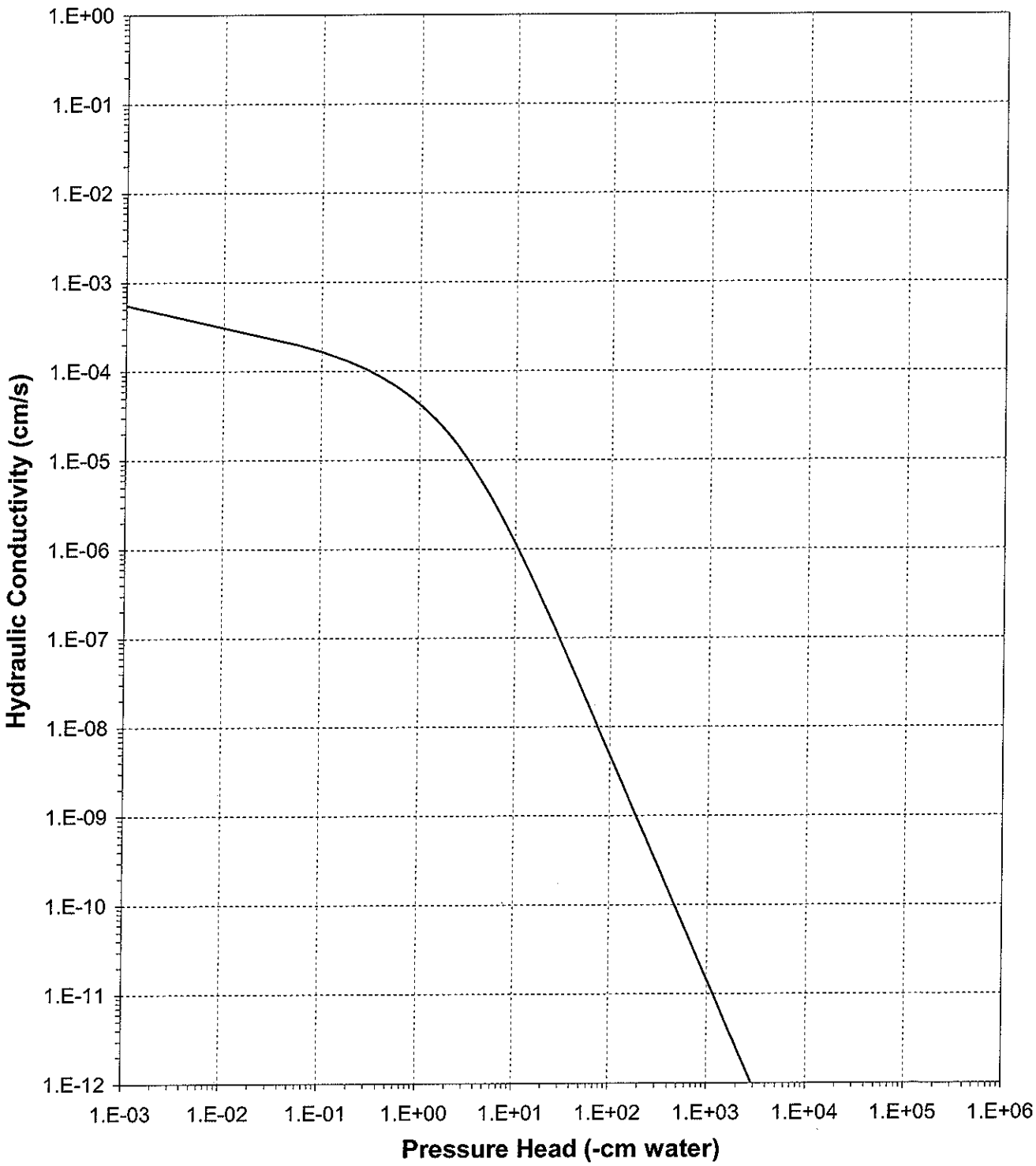
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-UEP-07A-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-UEP-07A-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07B-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 77.92
Tare wt., ring (g): 33.89
Tare wt., screen & clamp (g): 22.16
Initial sample volume (cm^3): 49.25
Initial dry bulk density (g/cm^3): 1.58
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 40.30

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Hanging column:	5-Nov-08	10:10	155.41	0.00	43.53
	11-Nov-08	11:11	153.27	51.00	39.19
Pressure plate:	24-Nov-08	9:06	151.74	611.88	36.08
	8-Dec-08	10:25	151.17	1529.70	34.92

Volume Adjusted Data[1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	51.00	---	---	---	---
Pressure plate:	611.88	---	---	---	---
	1529.70	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Salt Precipate formed on nozzel during Ksat.

Laboratory analysis by: A. Barraza/ K. Wright/ D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-UEP-07B-SG

Dry weight of dew point potentiometer sample* (g): 131.71
Tare weight, jar (g): 112.30
Initial sample bulk density (g/cm^3): 1.58

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)
Dew point potentiometer:	22-Oct-08	14:20	133.87	24271.2	17.58
	22-Oct-08	9:54	133.03	130534.4	10.78

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	24271.2	---	---	---	---
	130534.4	---	---	---	---

Dry weight of relative humidity box sample* (g): 70.33
Tare weight (g): 42.29
Initial sample bulk density (g/cm^3): 1.58

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)
Relative humidity box:	5-Nov-08	12:55	71.40	851293	6.03

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

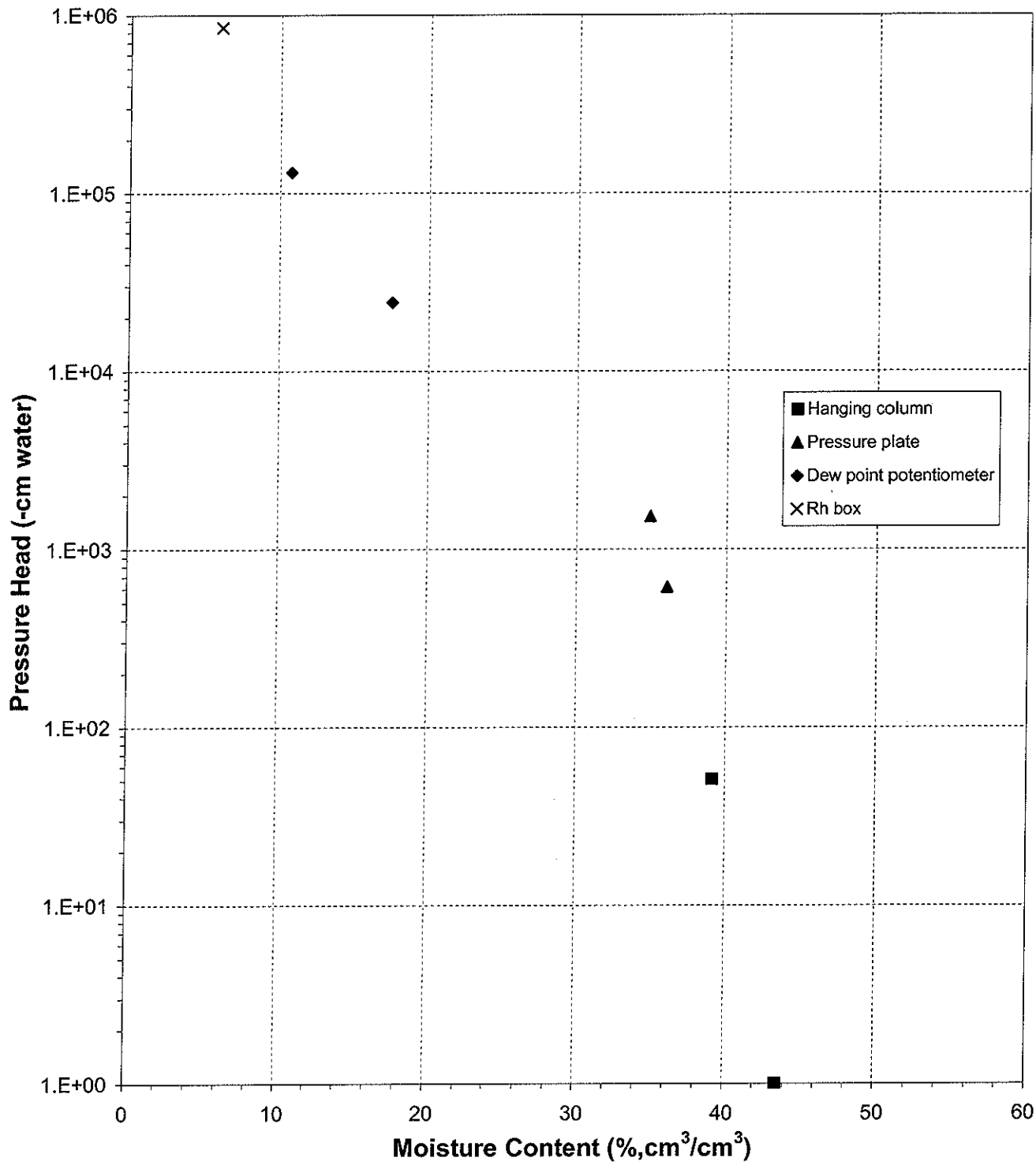
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: K. Mullen/R. Marshall/T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

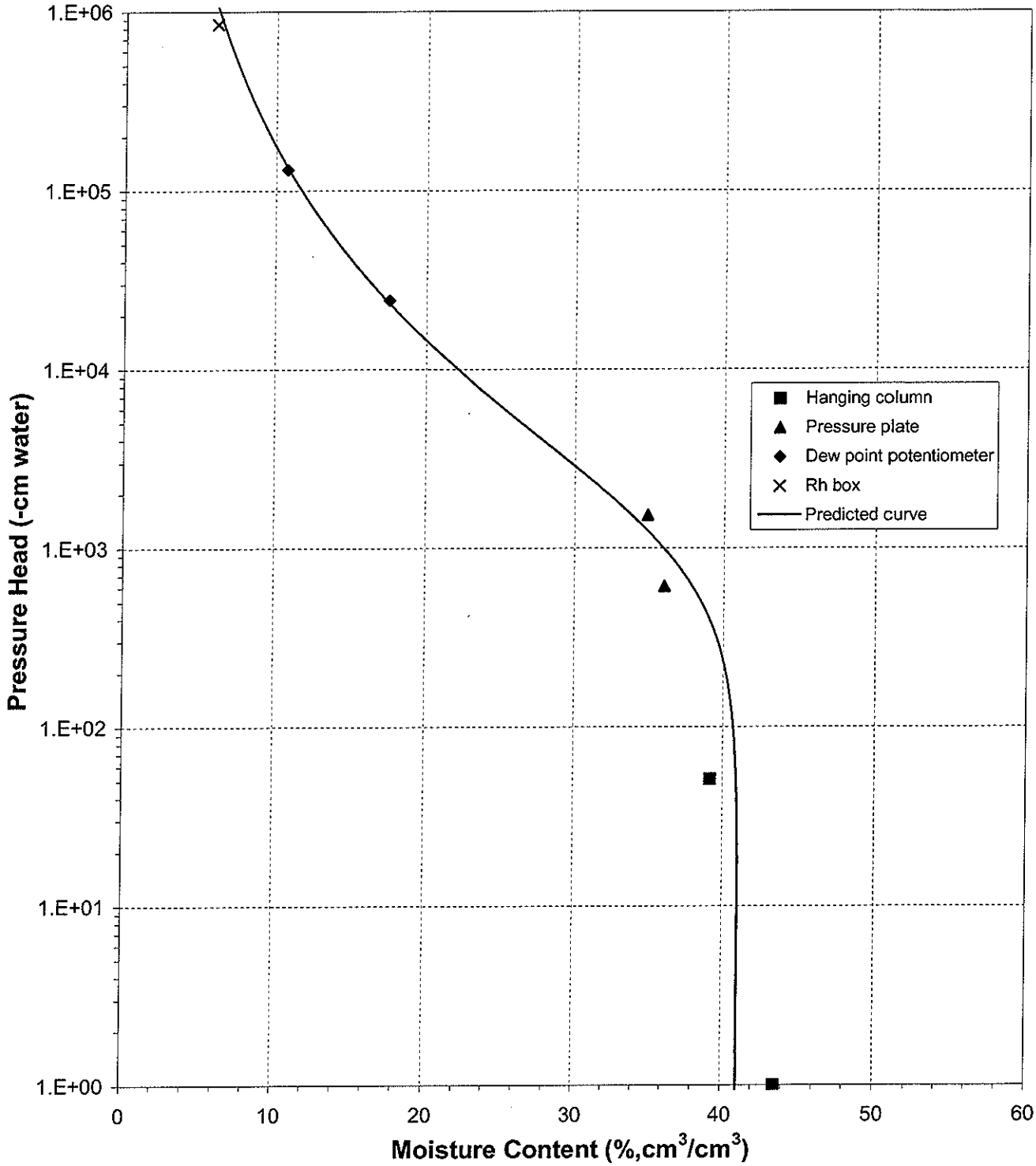
Water Retention Data Points

Sample Number: OU4-UEP-07B-SG



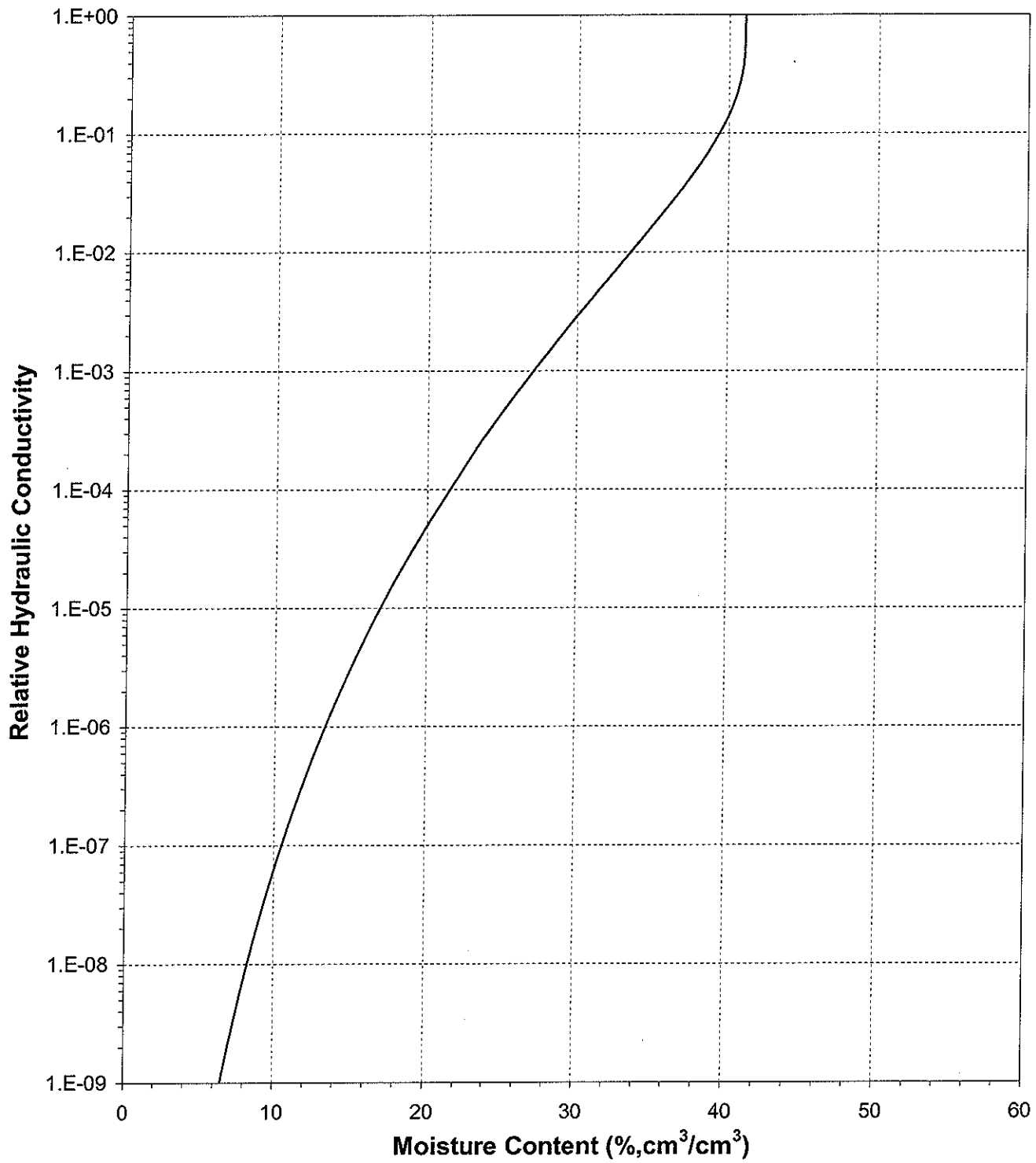
Predicted Water Retention Curve and Data Points

Sample Number: OU4-UEP-07B-SG



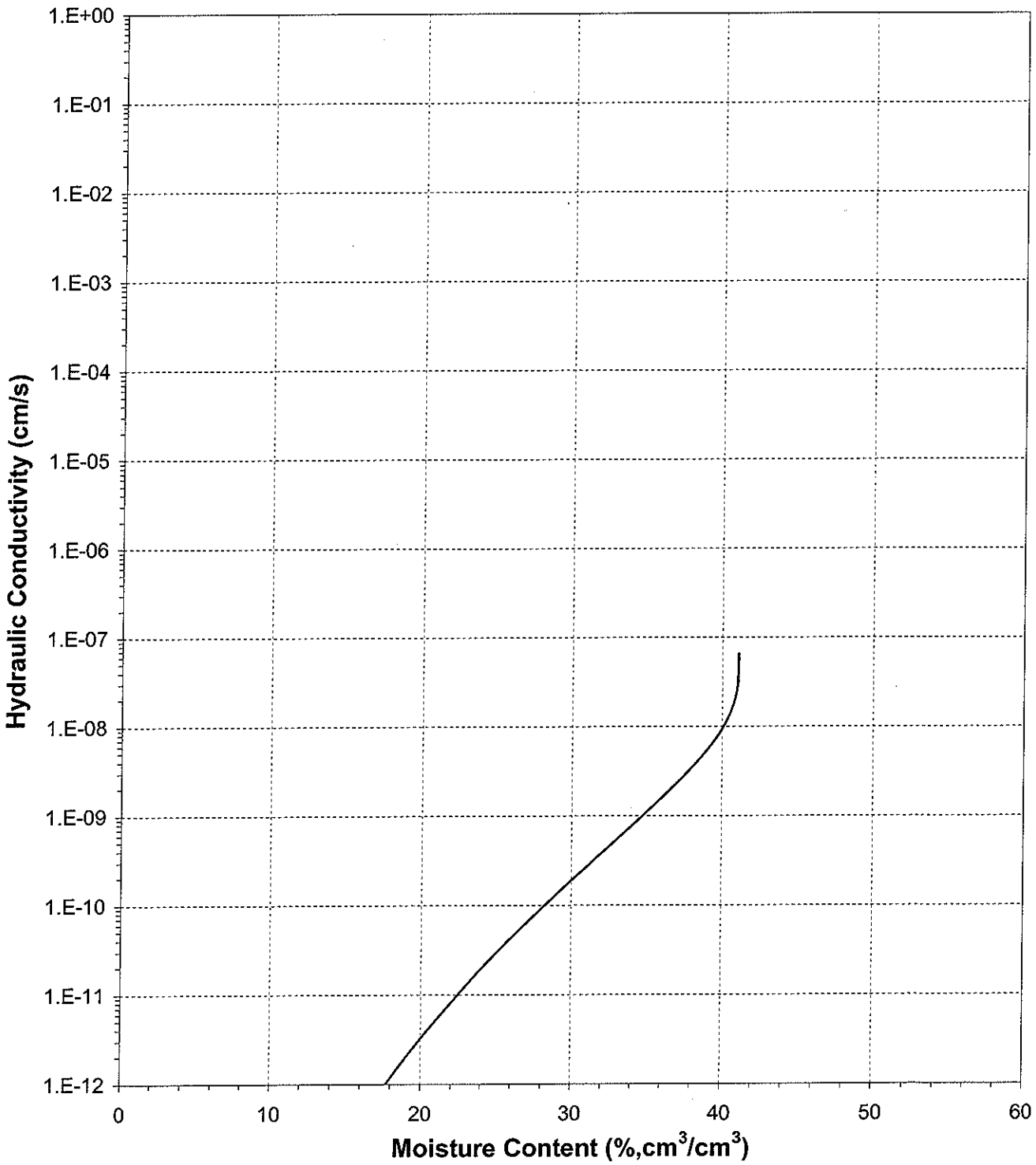
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-UEP-07B-SG



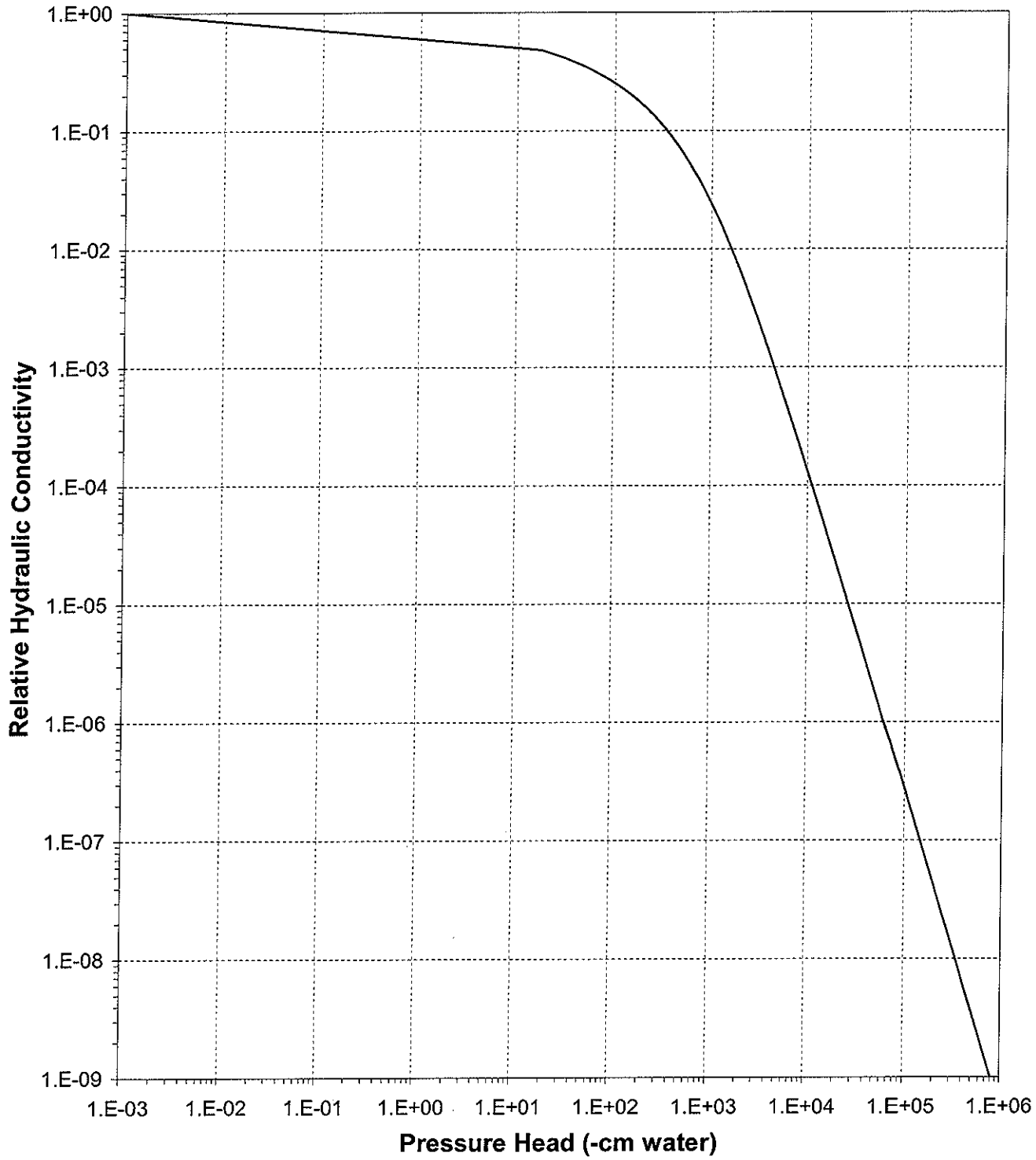
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-UEP-07B-SG



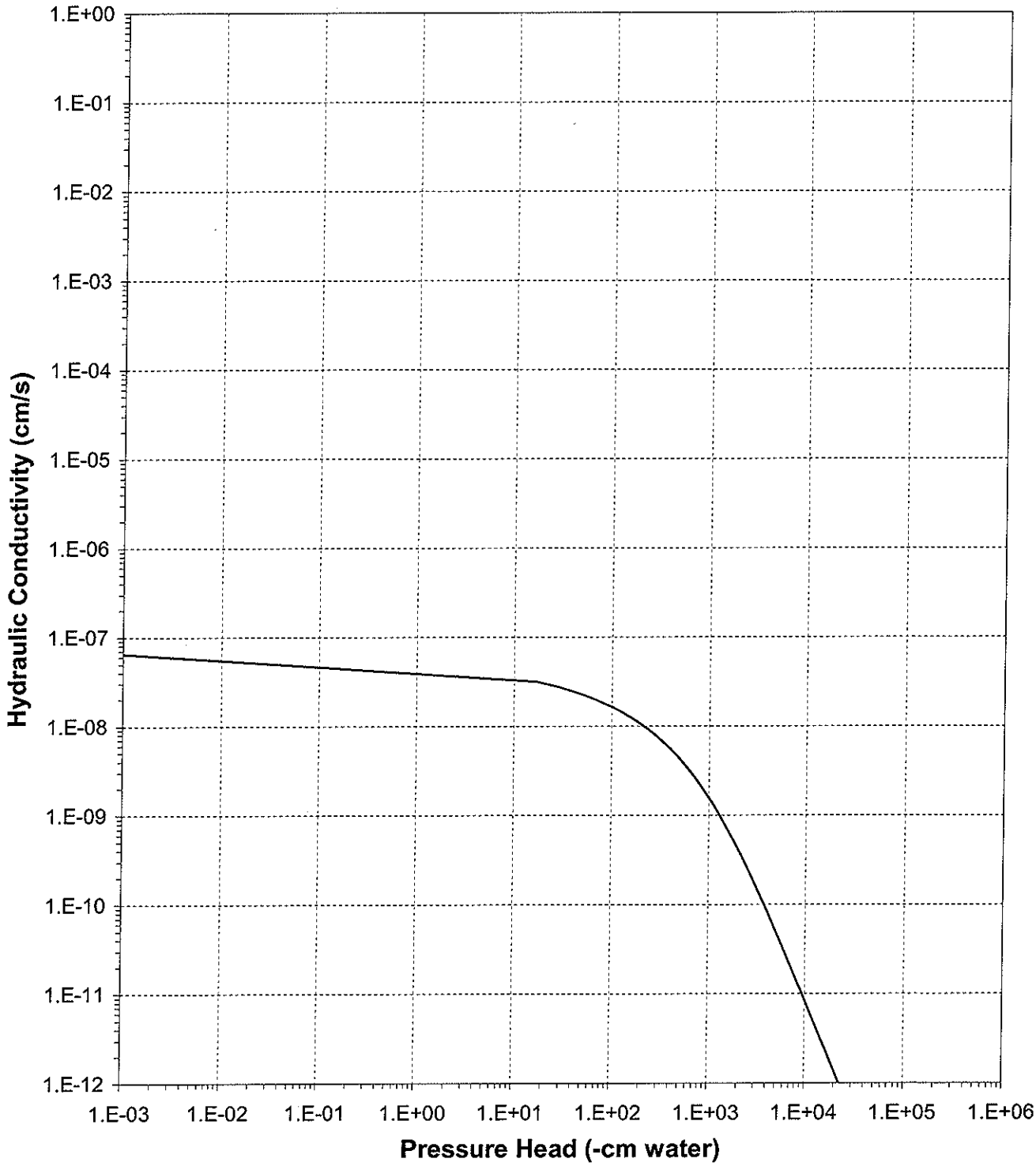
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-UEP-07B-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-UEP-07B-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08A-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 75.22
Tare wt., ring (g): 30.87
Tare wt., screen & clamp (g): 23.19
Initial sample volume (cm^3): 45.40
Initial dry bulk density (g/cm^3): 1.66
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 37.48

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)	
Hanging column:	30-Oct-08	11:20	144.73	0.00	36.37	‡‡
	5-Nov-08	11:30	143.22	5.00	33.02	‡‡
	12-Nov-08	10:00	135.36	19.50	14.40	‡‡
	19-Nov-08	15:00	132.09	46.00	6.66	‡‡
	26-Nov-08	10:15	131.95	82.00	6.33	‡‡
Pressure plate:	8-Dec-08	10:05	131.60	520.10	5.50	‡‡

Volume Adjusted Data[1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	42.48	-6.43%	1.77	33.19
	5.00	42.22	-7.01%	1.78	32.77
	19.50	42.22	-7.01%	1.78	32.77
	46.00	42.22	-7.01%	1.78	32.77
	82.00	42.22	-7.01%	1.78	32.77
Pressure plate:	520.10	42.22	-7.01%	1.78	32.77

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Sample tipped over on 11/19/08 and material spilled it was loosely compacted back in the ring.

Laboratory analysis by: K. Wright/ R. Marshall/ D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-UEP-08A-SG

Dry weight of dew point potentiometer sample* (g): 146.07
Tare weight, jar (g): 113.13
Initial sample bulk density (g/cm^3): 1.66

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)	
Dew point potentiometer:	22-Oct-08	13:45	146.45	102999.8	2.08	‡‡

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	102999.8	42.22	-7.01%	1.78	32.77

Dry weight of relative humidity box sample* (g): 70.00
Tare weight (g): 42.30
Initial sample bulk density (g/cm^3): 1.66

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)	
Relative humidity box:	5-Nov-08	12:55	70.20	851293	1.28	‡‡

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	42.22	-7.01%	1.78	32.77

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

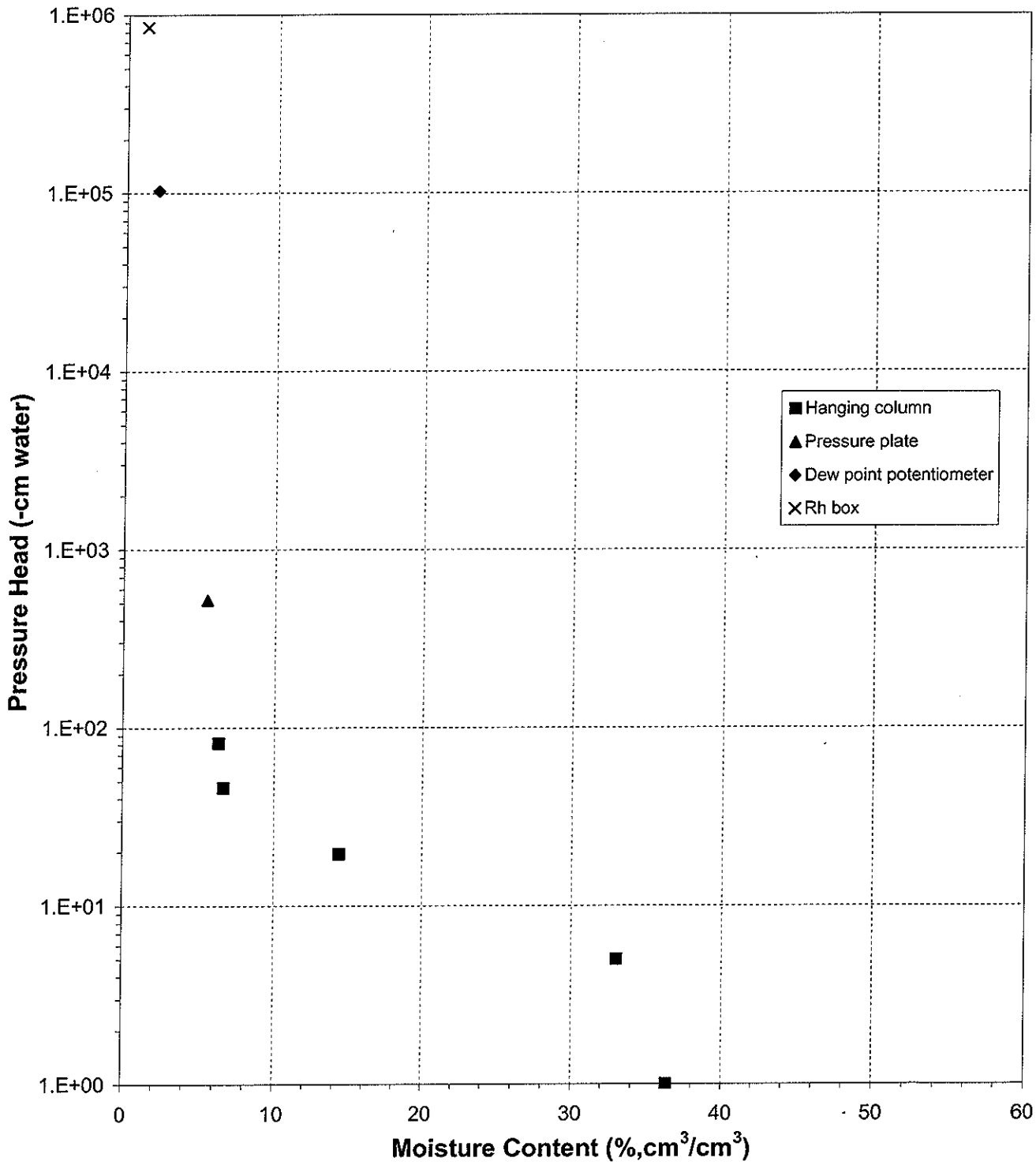
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: K. Mullen/T. Mendez/T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

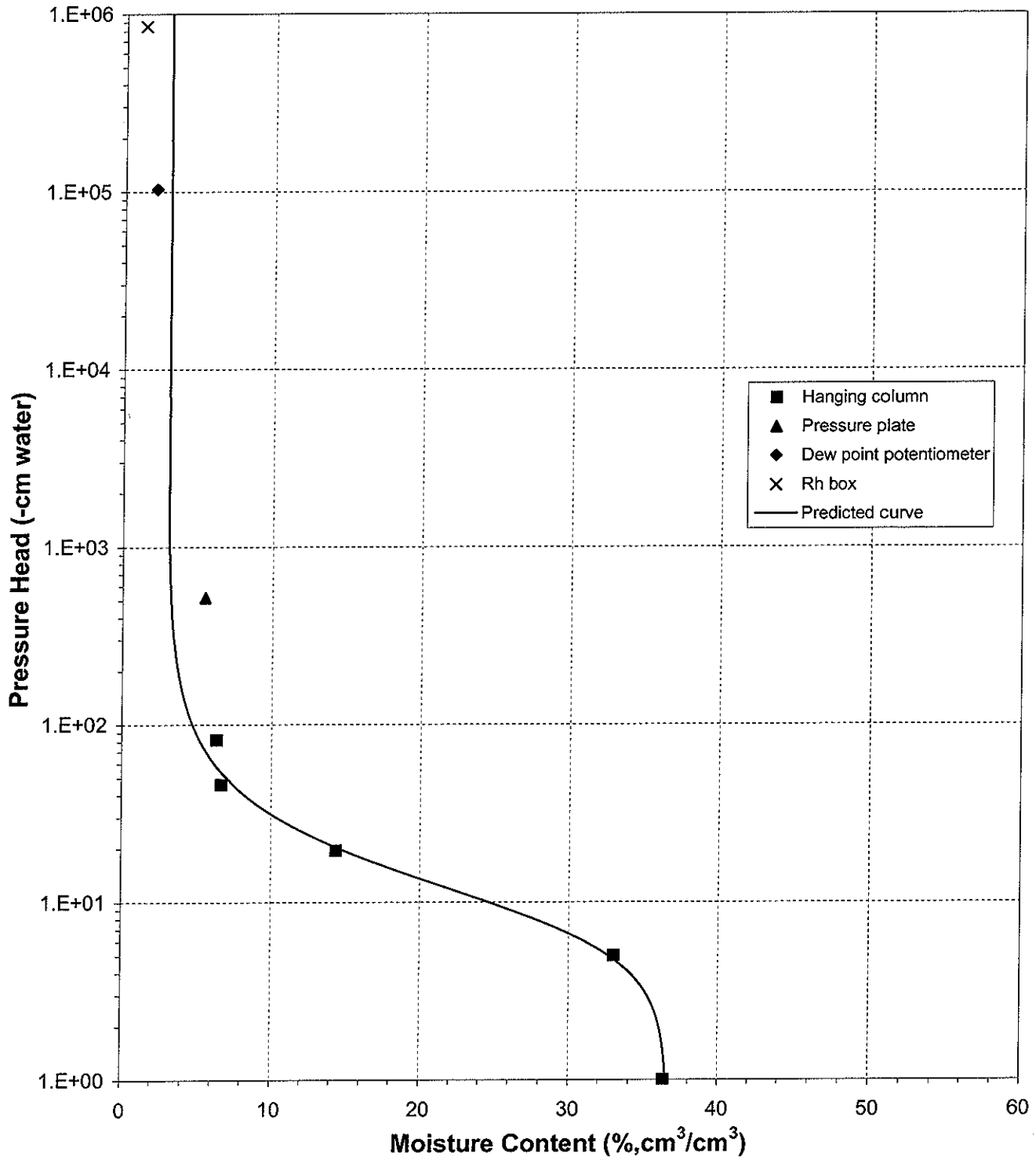
Water Retention Data Points

Sample Number: OU4-UEP-08A-SG



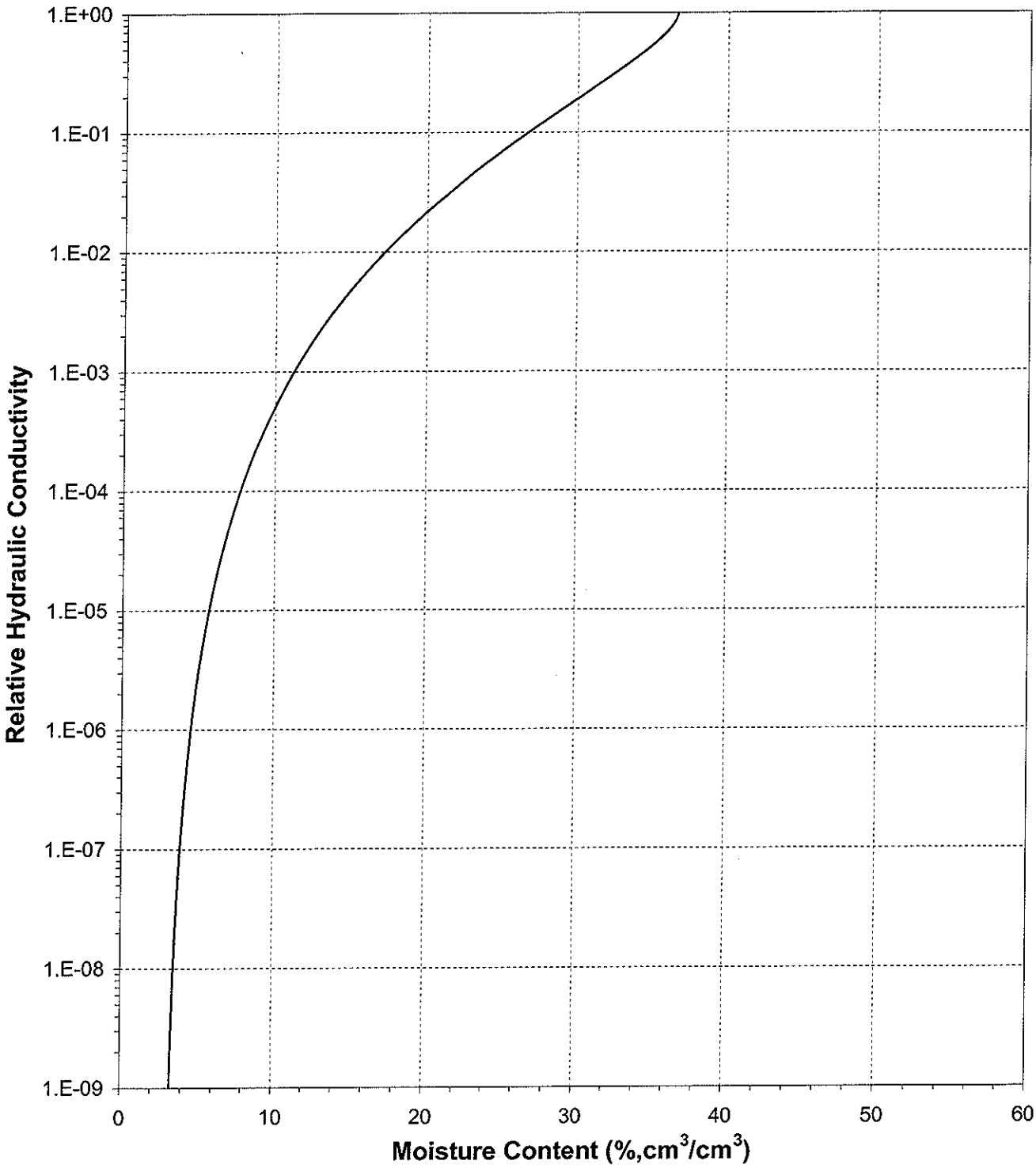
Predicted Water Retention Curve and Data Points

Sample Number: OU4-UEP-08A-SG



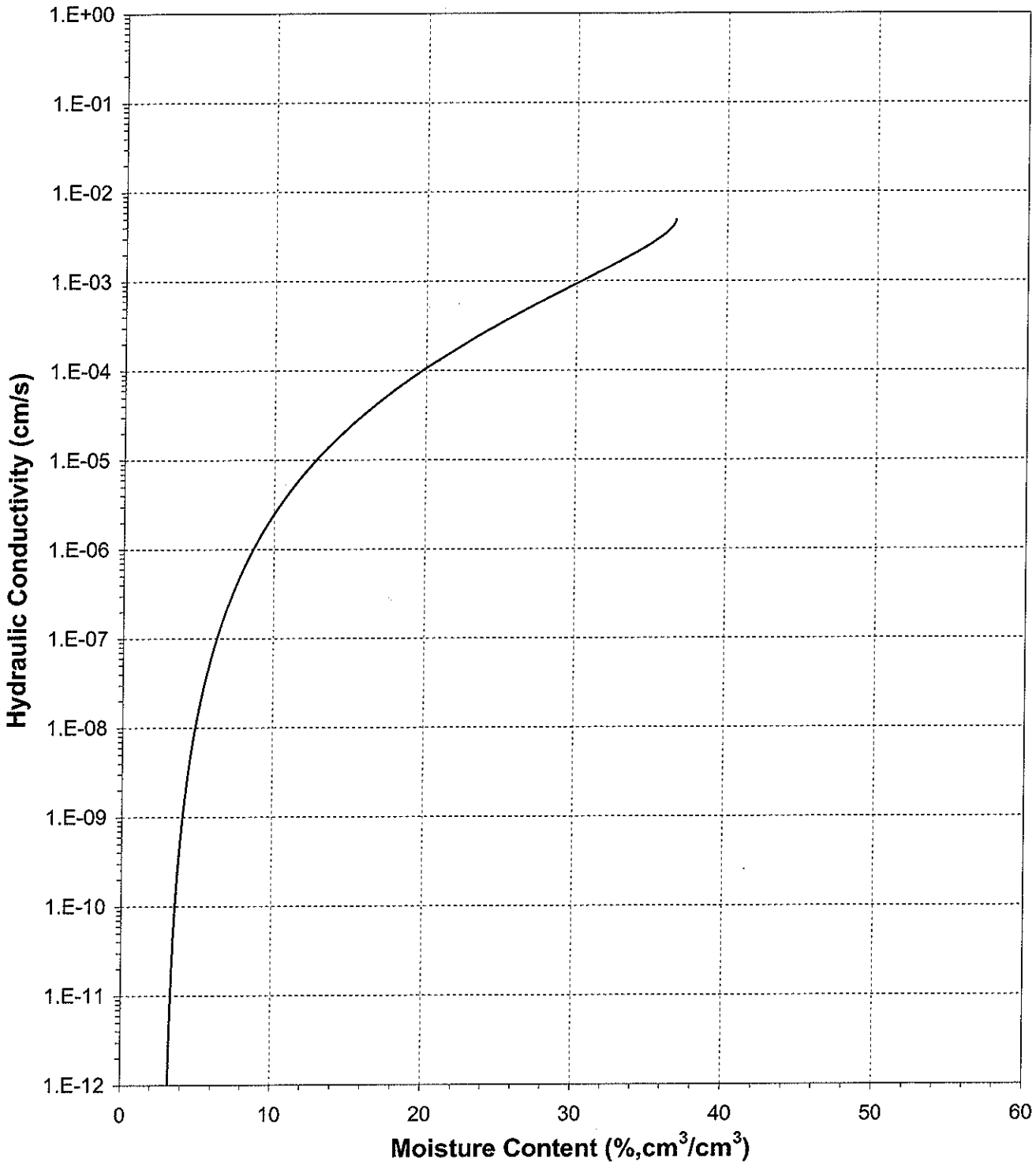
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-UEP-08A-SG



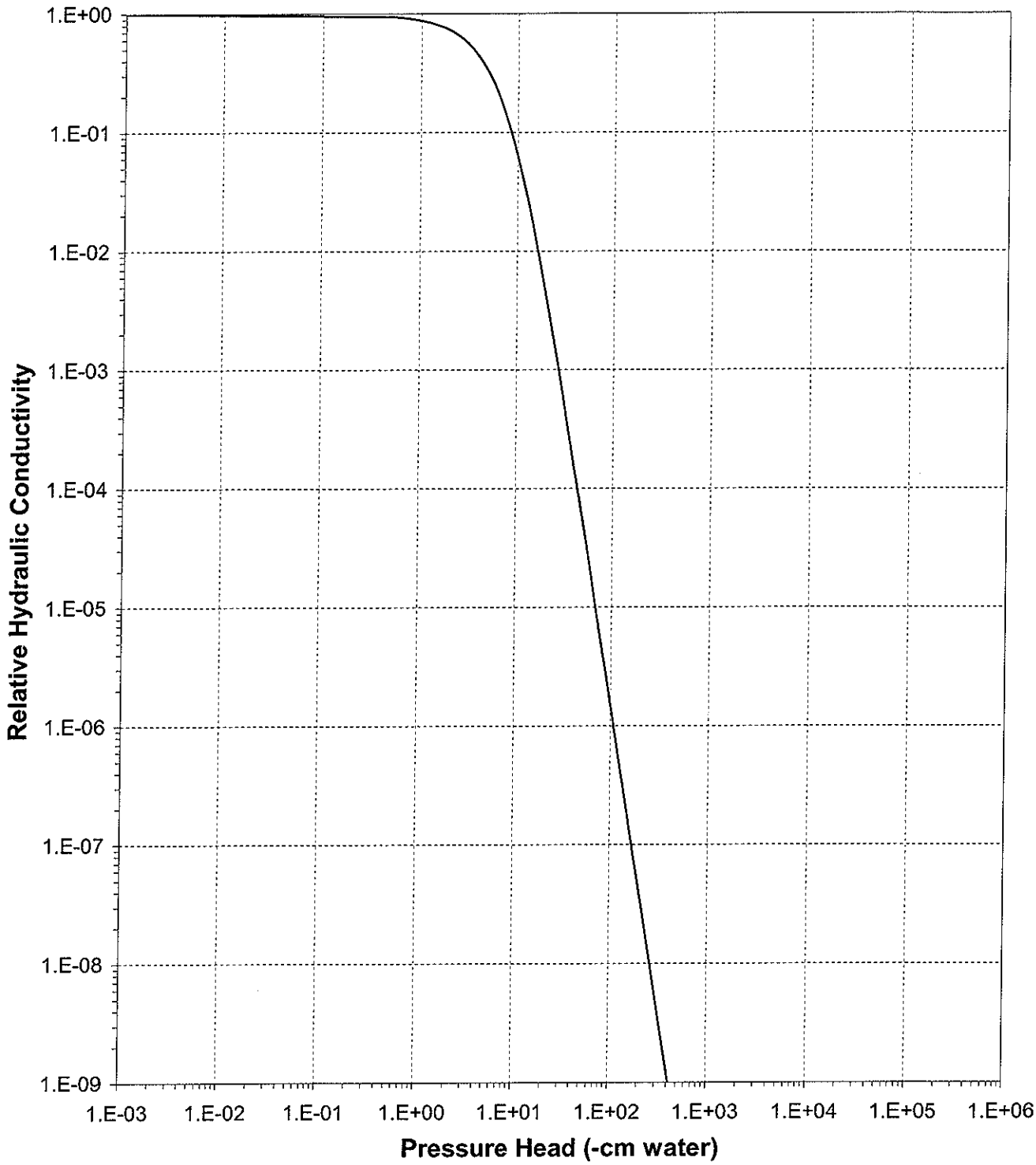
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-UEP-08A-SG



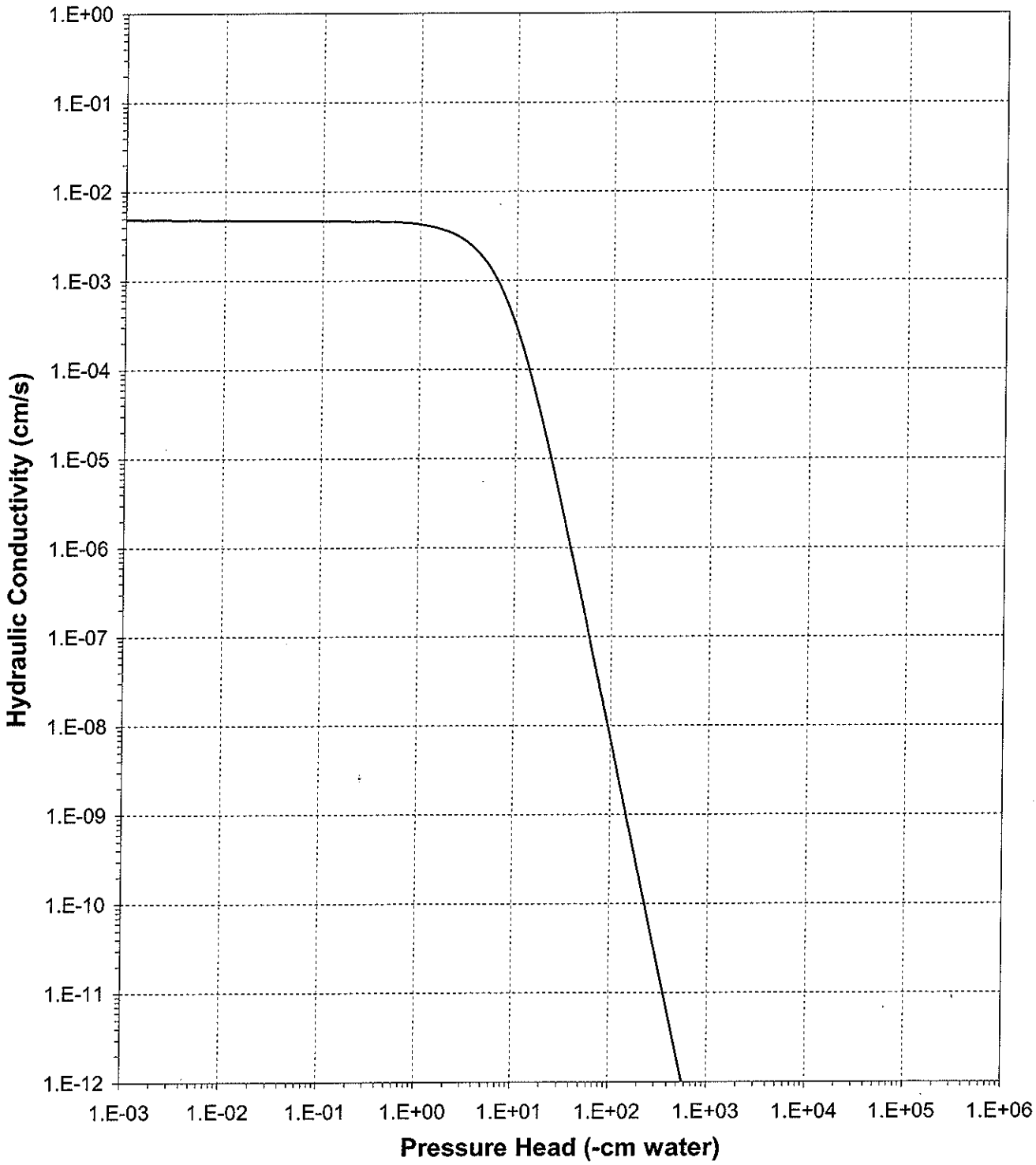
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-UEP-08A-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-UEP-08A-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08B-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 78.20
Tare wt., ring (g): 38.73
Tare wt., screen & clamp (g): 23.44
Initial sample volume (cm^3): 47.92
Initial dry bulk density (g/cm^3): 1.63
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 38.42

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content † (% vol)
Hanging column:	30-Oct-08	11:45	160.96	0.00	42.97
	5-Nov-08	12:45	159.94	25.00	40.84
	12-Nov-08	10:30	154.18	64.00	28.81
	19-Nov-08	15:00	150.58	123.00	21.31
Pressure plate:	30-Nov-08	13:56	148.60	509.90	17.17

Volume Adjusted Data [1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	25.00	---	---	---	---
	64.00	---	---	---	---
	123.00	---	---	---	---
Pressure plate:	509.90	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Salt Precipitate on top of sample.

Laboratory analysis by: K. Wright/ R. Marshall
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-UEP-08B-SG

Dry weight of dew point potentiometer sample* (g): 143.68
Tare weight, jar (g): 117.83
Initial sample bulk density (g/cm^3): 1.63

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content † (% vol)
Dew point potentiometer:	23-Oct-08	16:46	144.40	276365.8	4.56

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	276365.8	---	---	---	---

Dry weight of relative humidity box sample* (g): 65.20
Tare weight (g): 36.82
Initial sample bulk density (g/cm^3): 1.63

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content † (% vol)
Relative humidity box:	5-Nov-08	12:55	65.78	851293	3.29

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

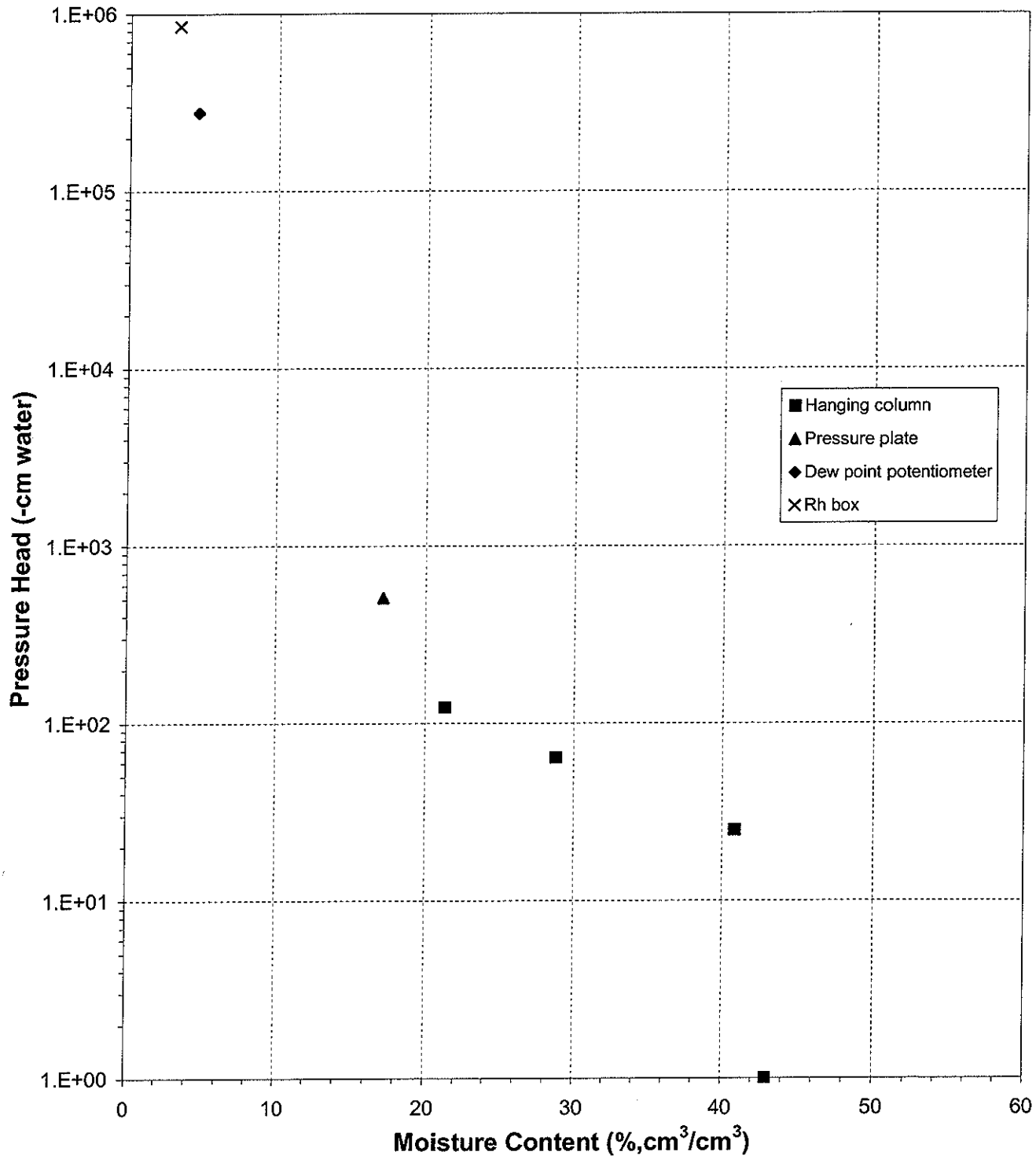
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: K. Wright/T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

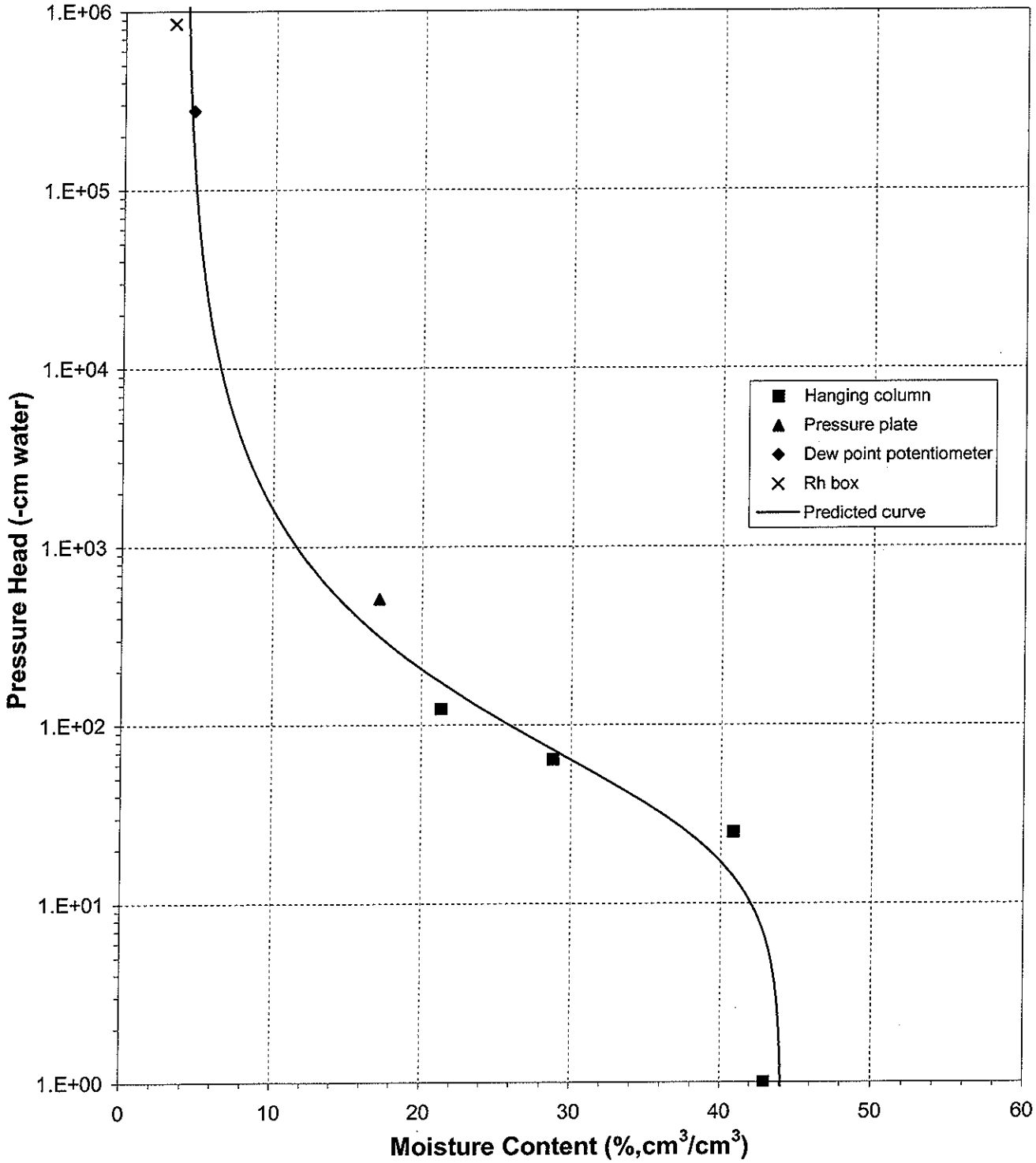
Water Retention Data Points

Sample Number: OU4-UEP-08B-SG



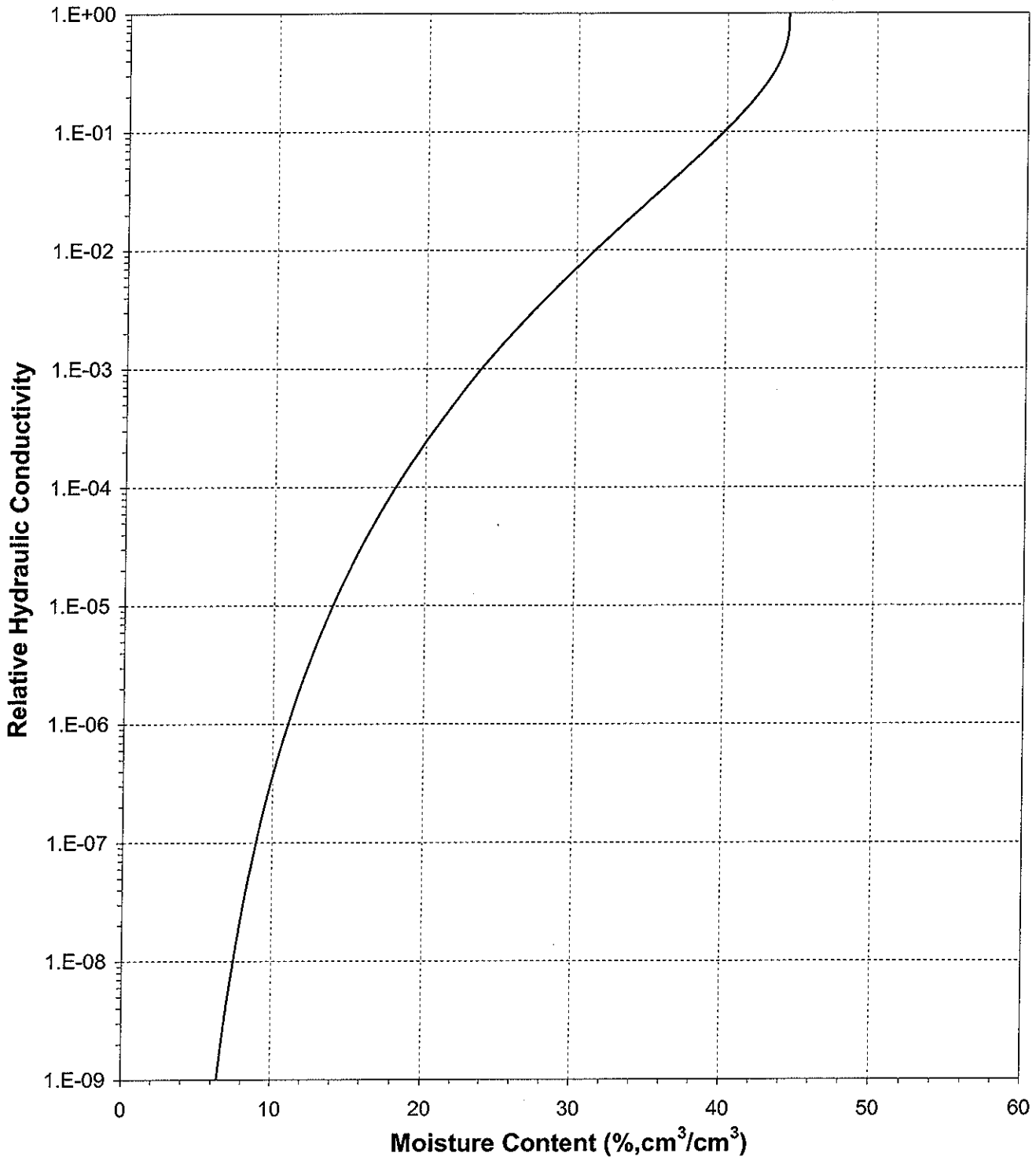
Predicted Water Retention Curve and Data Points

Sample Number: OU4-UEP-08B-SG



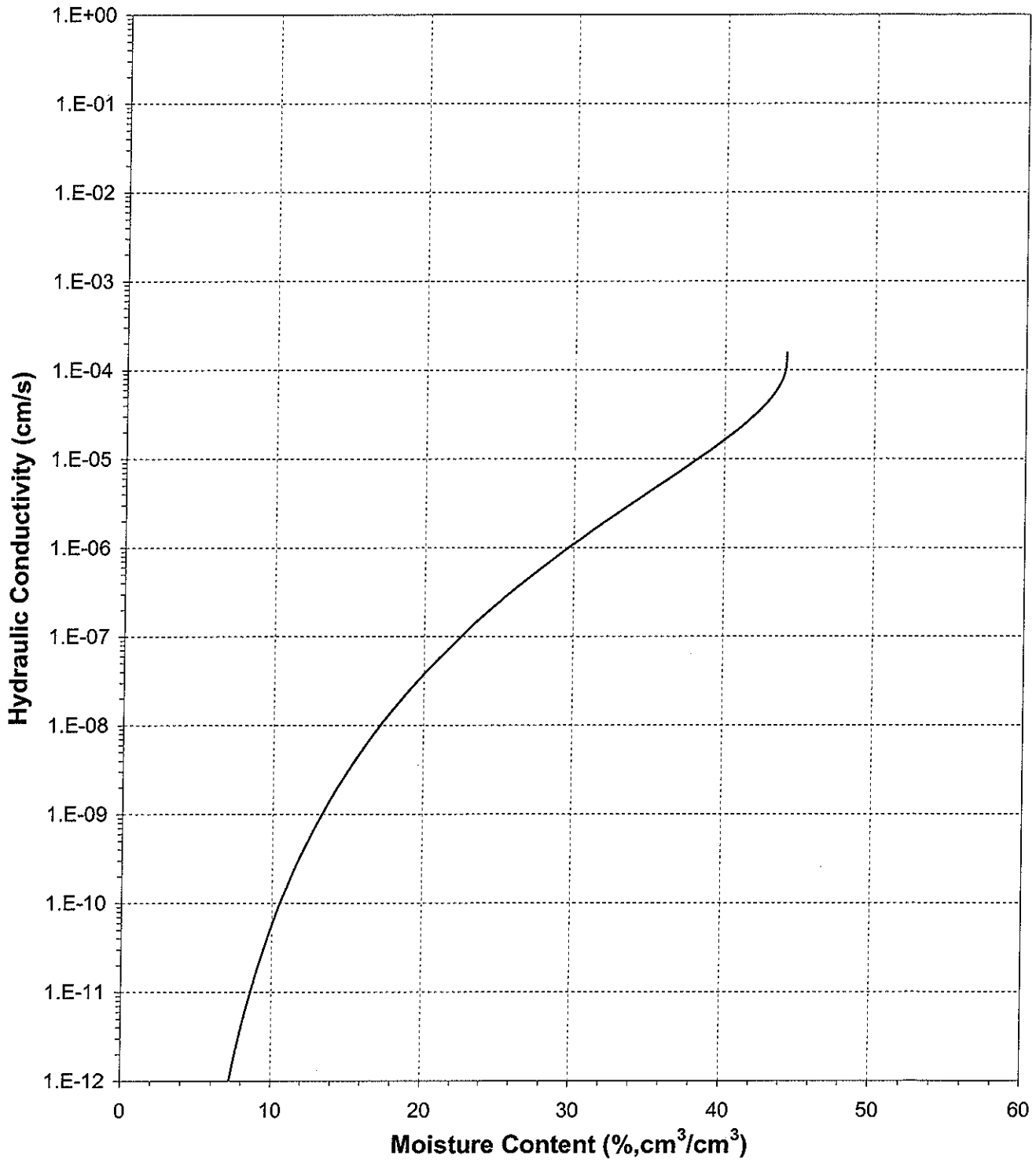
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-UEP-08B-SG



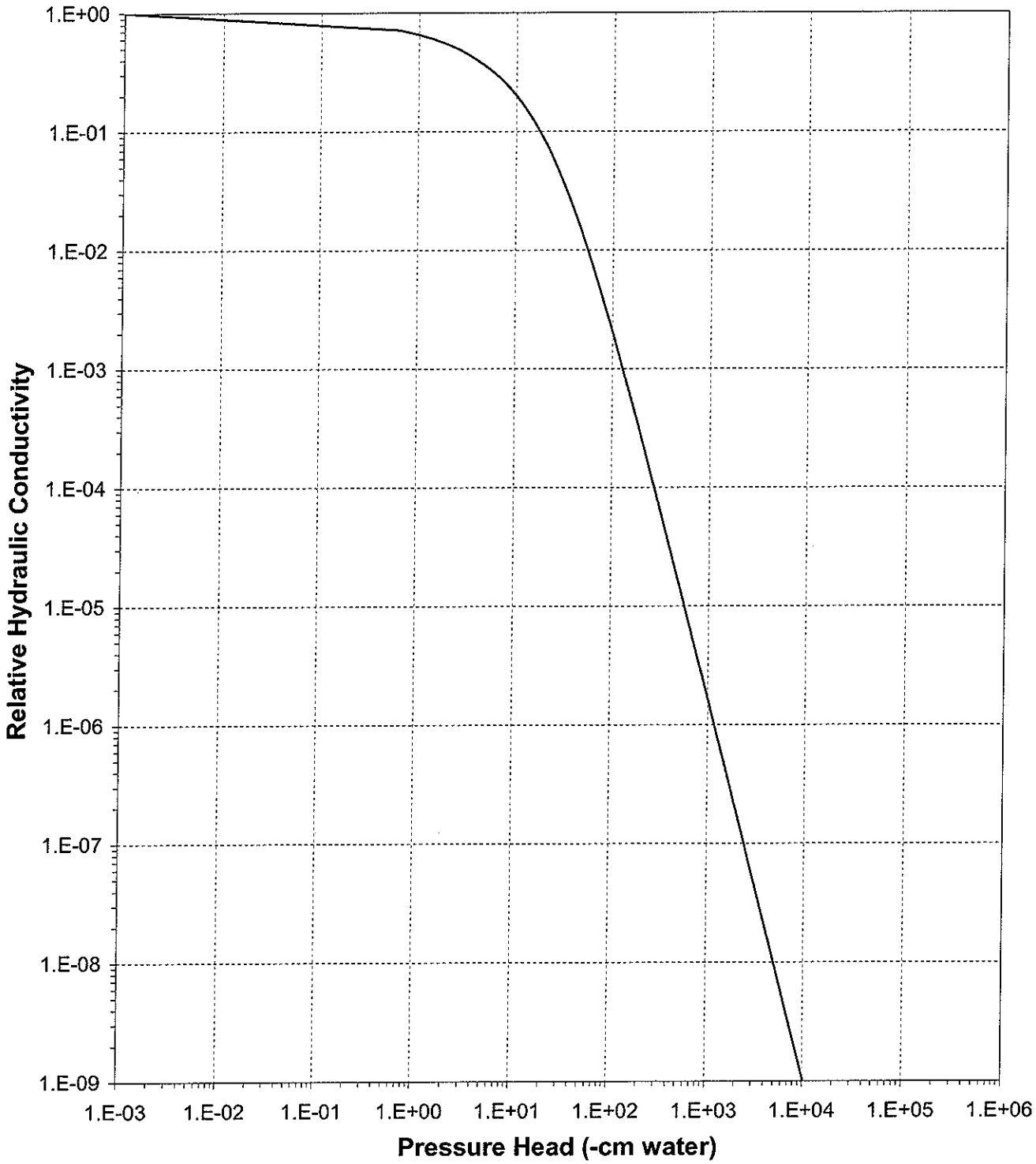
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-UEP-08B-SG



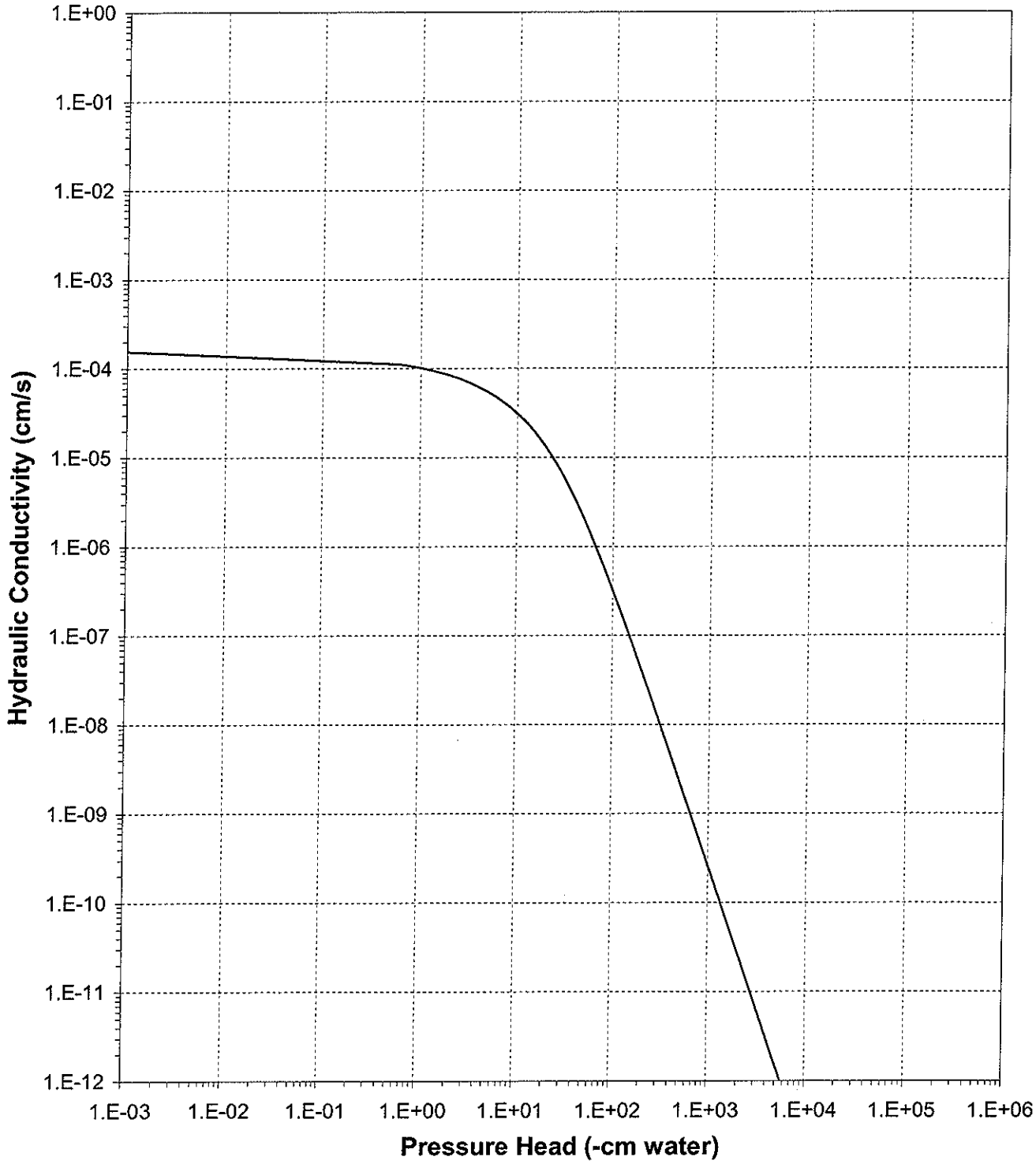
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-UEP-08B-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-UEP-08B-SG



Particle Size Analysis

Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification
OU4-LEP-01A-SG	0.087	0.29	0.41	4.7	0.81	WS/H	Poorly-graded sand with silt (SP-SM)	Sand
OU4-LEP-01B-SG	0.041	0.36	0.47	11	2.5	WS/H	Well-graded sand with silt (SW-SM)	Loamy Sand †
OU4-LEP-03A-SG	0.00017	0.0063	0.0093	55	1.2	WS/H	Lean clay (CL)	Silty Clay Loam (Est)
OU4-LEP-03B-SG	0.0017	0.021	0.028	16	2.5	WS/H	Silty clay (CL-ML)	Silt Loam
OU4-LEP-05A-SG	0.00016	0.0024	0.0036	23	0.67	WS/H	Fat clay (CH)	Silty Clay (Est)
OU4-LEP-05B-SG	0.0011	0.13	0.17	155	11	WS/H	Clayey sand (SC)	Sandy Loam (Est)
OU4-UEP-07A-SG	0.048	0.59	0.95	20	0.97	WS/H	Silty sand (SM)	Loamy Sand †
OU4-UEP-07B-SG	0.00045	0.15	0.21	467	16	WS/H	Clayey sand (SC)	Sandy Loam (Est)
OU4-UEP-08A-SG	0.088	0.71	1.0	11	1.1	WS/H	Well-graded sand with silt (SW-SM)	Sand †
OU4-UEP-08B-SG	0.00076	0.043	0.065	86	8.9	WS/H	Sandy silt s(ML)	Loam (Est)

d_{50} = Median particle diameter

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01A-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 296.71
Weight Passing #10 (g): 277.00
Weight Retained #10 (g): 19.71
Weight of Hydrometer Sample (g): 52.74
Calculated Weight of Sieve Sample (g): 56.49

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	296.71	100.00
	2"	50	0.00	0.00	296.71	100.00
	1.5"	38.1	0.00	0.00	296.71	100.00
	1"	25	0.00	0.00	296.71	100.00
	3/4"	19.0	0.00	0.00	296.71	100.00
	3/8"	9.5	0.00	0.00	296.71	100.00
	4	4.75	3.27	3.27	293.44	98.90
	10	2.00	16.44	19.71	277.00	93.36
-10			(Based on calculated sieve wt.)			
	20	0.85	7.73	11.48	45.01	79.67
	40	0.425	10.38	21.86	34.63	61.30
	60	0.250	8.98	30.84	25.65	45.40
	140	0.106	19.00	49.84	6.65	11.77
	200	0.075	1.78	51.62	4.87	8.62
	dry pan		0.25	51.87	4.62	
	wet pan			4.62	0.00	

d_{10} (mm): 0.087
d_{16} (mm): 0.12
d_{30} (mm): 0.17
d_{50} (mm): 0.29
d_{60} (mm): 0.41
d_{84} (mm): 1.1

Median Particle Diameter--d_{50} (mm): 0.29
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 4.7
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 0.81
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.50

Classification of fines (visual method): ML

ASTM Soil Classification: Poorly-graded sand with silt (SP-SM)
USDA Soil Classification: Sand

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 31-Dec-08
Start Time: 9:12

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

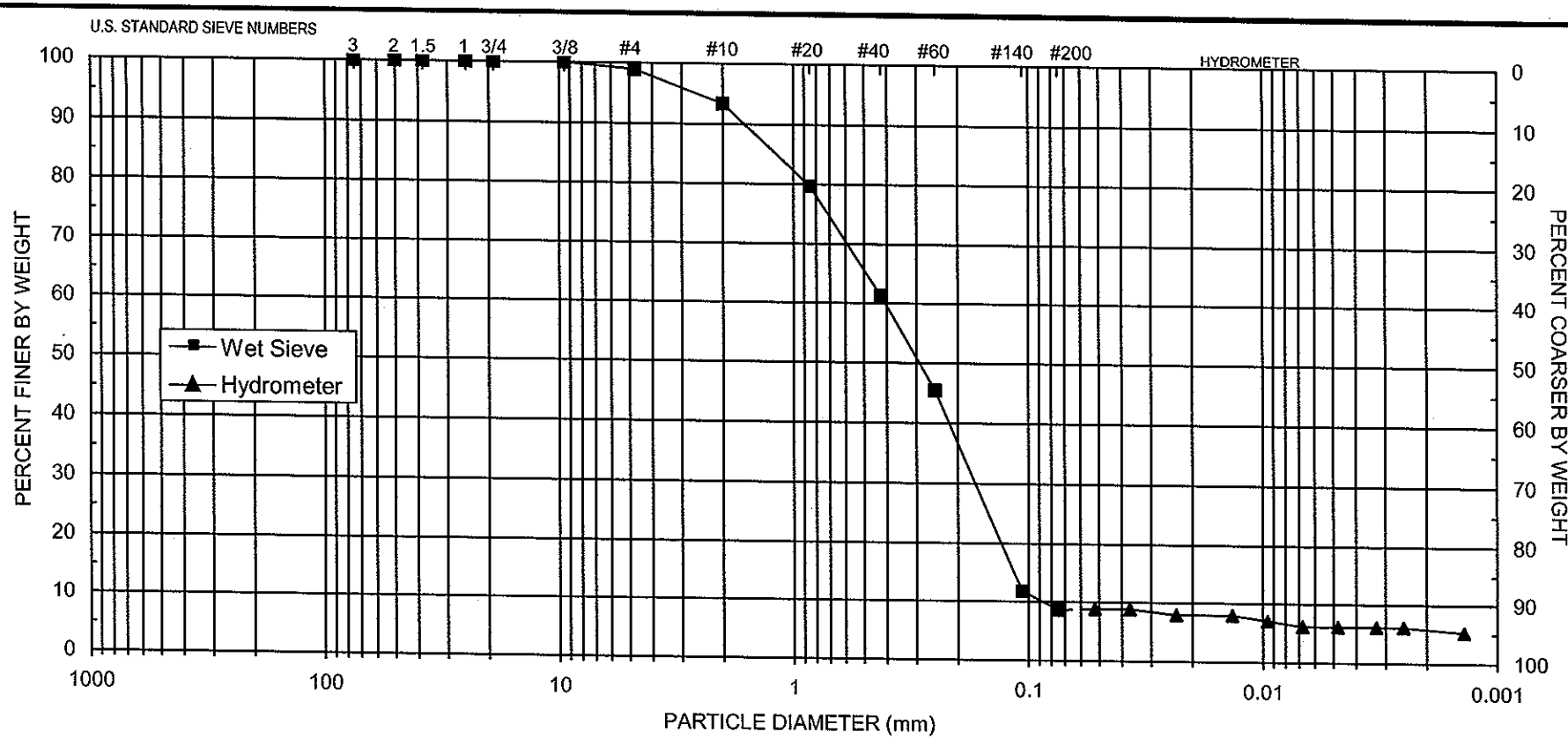
Initial Wt. (g)*:* 52.74
Total Sample Wt. (g)*:* 296.71
Wt. Passing #10 (g): 277.00

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
31-Dec-08	1	19.3	11.5**	6.5	5.0	14.4	0.05221	9.5	8.9
	2	19.3	11.5**	6.5	5.0	14.4	0.03692	9.5	8.9
	5	19.3	11.0	6.5	4.5	14.5	0.02342	8.5	8.0
	15	19.3	11.0	6.5	4.5	14.5	0.01352	8.5	8.0
	30	19.4	10.5	6.5	4.0	14.6	0.00958	7.6	7.1
	60	19.5	10.0	6.5	3.5	14.7	0.00678	6.6	6.2
	120	19.7	10.0	6.5	3.5	14.7	0.00478	6.6	6.2
	250	20.3	10.0	6.5	3.5	14.7	0.00329	6.6	6.2
	420	21.1	10.0	6.5	3.5	14.7	0.00251	6.6	6.2
1-Jan-09	1441	19.4	10.0	7.0	3.0	14.7	0.00139	5.7	5.3

Comments:

* Dispersion device: mechanically operated stirring device
** Discontinuity in initial data points due to sample characteristics.

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.087**	d_{30} = **0.17**	d_{50} = **0.29**	d_{60} = **0.41**	C_u = **4.7**	C_c = **0.81**

SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION	USDA CLASSIFICATION
OU4-LEP-01A-SG	**136259**	**Poorly-graded sand with silt (SP-SM)**	**Sand**

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01B-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 402.09
Weight Passing #10 (g): 338.98
Weight Retained #10 (g): 63.11
Weight of Hydrometer Sample (g): 48.85
Calculated Weight of Sieve Sample (g): 57.94

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	402.09	100.00
	2"	50	0.00	0.00	402.09	100.00
	1.5"	38.1	0.00	0.00	402.09	100.00
	1"	25	0.00	0.00	402.09	100.00
	3/4"	19.0	0.00	0.00	402.09	100.00
	3/8"	9.5	0.00	0.00	402.09	100.00
	4	4.75	1.49	1.49	400.60	99.63
	10	2.00	61.62	63.11	338.98	84.30
-10			(Based on calculated sieve wt.)			
	20	0.85	5.89	14.98	42.96	74.14
	40	0.425	9.42	24.40	33.54	57.88
	60	0.250	14.47	38.87	19.07	32.91
	140	0.106	11.24	50.11	7.83	13.51
	200	0.075	1.01	51.12	6.82	11.77
	dry pan		0.05	51.17	6.77	
	wet pan			6.77	0.00	

d_{10} (mm): 0.041
d_{16} (mm): 0.12
d_{30} (mm): 0.22
d_{50} (mm): 0.36
d_{60} (mm): 0.47
d_{84} (mm): 1.9

Median Particle Diameter --d_{50} (mm): 0.36
Uniformity Coefficient, Cu --[d_{60}/d_{10}] (mm): 11
Coefficient of Curvature, Cc --[$(d_{30})^2/(d_{10}*d_{60})$] (mm): 2.5
Mean Particle Diameter --[$(d_{16}+d_{50}+d_{84})/3$] (mm): 0.79

Classification of fines (visual method): ML

ASTM Soil Classification: Well-graded sand with silt (SW-SM)
USDA Soil Classification: Loamy Sand †

† Greater than 10% of sample is coarse material

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Jan-09
Start Time: 9:06

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

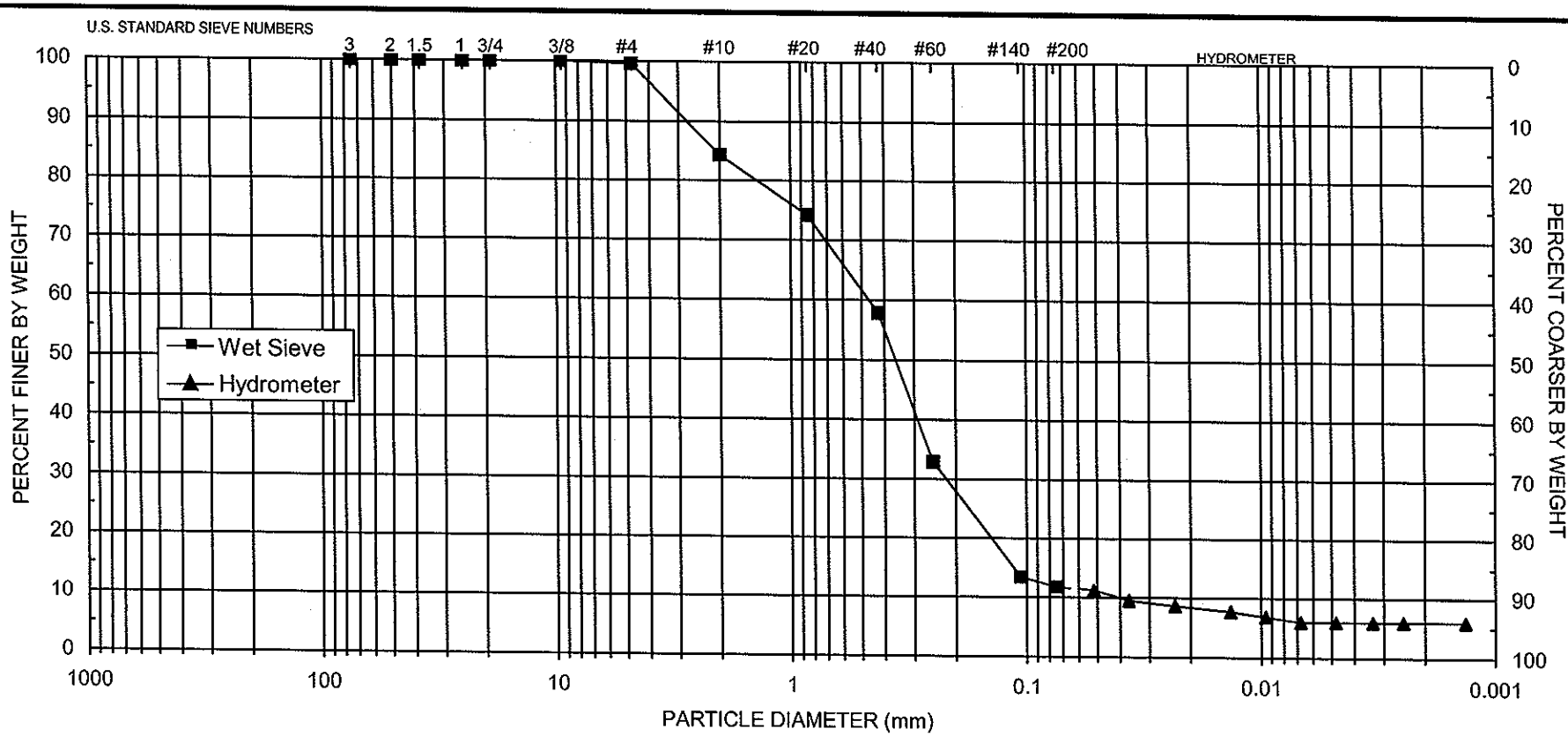
Initial Wt. (g)*:* 48.85
Total Sample Wt. (g)*:* 402.09
Wt. Passing #10 (g): 338.98

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Jan-09	1	19.2	13.5	7.0	6.5	14.1	0.05168	13.3	11.2
	2	19.2	12.5	7.0	5.5	14.3	0.03676	11.3	9.5
	5	19.2	12.0	7.0	5.0	14.3	0.02331	10.2	8.6
	15	19.2	11.5	7.0	4.5	14.4	0.01350	9.2	7.8
	30	19.2	11.0	7.0	4.0	14.5	0.00957	8.2	6.9
	60	19.2	10.5	7.0	3.5	14.6	0.00679	7.2	6.0
	120	19.2	10.5	7.0	3.5	14.6	0.00480	7.2	6.0
	250	19.2	10.0	6.5	3.5	14.7	0.00333	7.2	6.0
	455	19.2	10.0	6.5	3.5	14.7	0.00247	7.2	6.0
3-Jan-09	1524	19.2	11.5	8.0	3.5	14.4	0.00134	7.2	6.0

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.041**	d_{30} = **0.22**	d_{50} = **0.36**	d_{60} = **0.47**	C_u = **11**	C_c = **2.5**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-LEP-01B-SG	**136259**	**Well-graded sand with silt (SW-SM)**		**Loamy Sand †**	

† Greater than 10% of sample is coarse material

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03A-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 381.27
Weight Passing #10 (g): 380.44
Weight Retained #10 (g): 0.83
Weight of Hydrometer Sample (g): 50.39
Calculated Weight of Sieve Sample (g): 50.50

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	381.27	100.00
	2"	50	0.00	0.00	381.27	100.00
	1.5"	38.1	0.00	0.00	381.27	100.00
	1"	25	0.00	0.00	381.27	100.00
	3/4"	19.0	0.00	0.00	381.27	100.00
	3/8"	9.5	0.00	0.00	381.27	100.00
	4	4.75	0.00	0.00	381.27	100.00
	10	2.00	0.83	0.83	380.44	99.78
-10			(Based on calculated sieve wt.)			
	20	0.85	0.03	0.14	50.36	99.72
	40	0.425	0.04	0.18	50.32	99.64
	60	0.250	0.19	0.37	50.13	99.27
	140	0.106	1.69	2.06	48.44	95.92
	200	0.075	1.93	3.99	46.51	92.10
	dry pan		0.17	4.16	46.34	
	wet pan			46.34	0.00	

d_{10} (mm): 0.00017
d_{16} (mm): 0.00031
d_{30} (mm): 0.0014
d_{50} (mm): 0.0063
d_{60} (mm): 0.0093
d_{84} (mm): 0.032

Median Particle Diameter--d_{50} (mm): 0.0063
Uniformity Coefficient, Cu--[d_{60}/d_{10}] (mm): 55
Coefficient of Curvature, Cc--[$(d_{30})^2/(d_{10}*d_{60})$] (mm): 1.2
Mean Particle Diameter--[$(d_{16}+d_{50}+d_{84})/3$] (mm): 0.013

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Classification of fines: CL

ASTM Soil Classification: Lean clay (CL)
USDA Soil Classification: Silty Clay Loam

Laboratory analysis by: K. Wright
Data entered by: T. Mendez
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 12-Jan-09
Start Time: 9:12

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

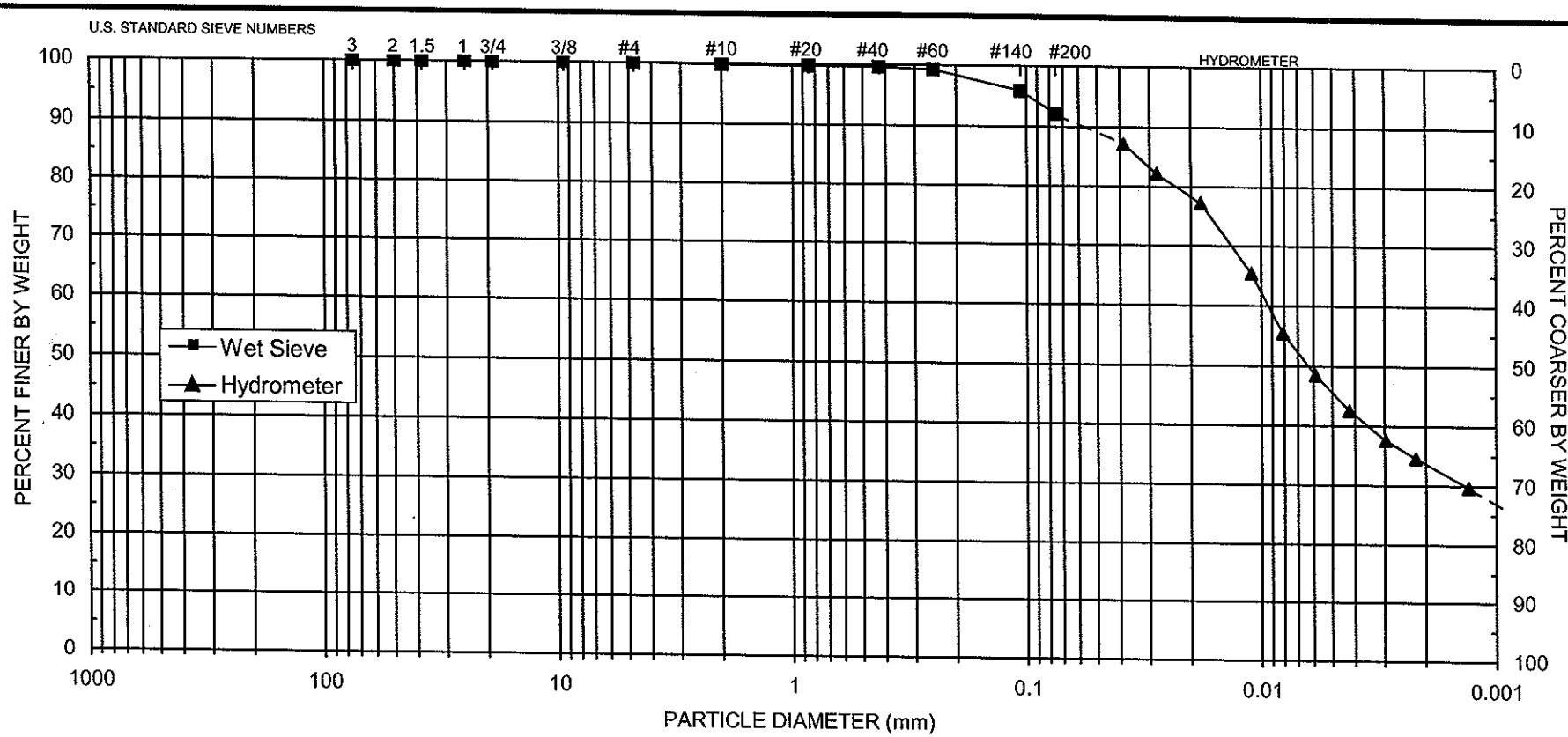
Initial Wt. (g): 50.39
Total Sample Wt. (g): 381.27
Wt. Passing #10 (g): 380.44

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
12-Jan-09	1	19.6	51.0	7.0	44.0	7.9	0.03861	87.3	87.1
	2	19.6	48.5	7.0	41.5	8.3	0.02800	82.4	82.2
	5	19.6	46.0	7.0	39.0	8.8	0.01814	77.4	77.2
	15	19.7	40.0	7.0	33.0	9.7	0.01103	65.5	65.3
	30	19.7	35.0	7.0	28.0	10.6	0.00812	55.6	55.4
	60	19.8	31.5	7.0	24.5	11.1	0.00589	48.6	48.5
	120	20.2	28.5	7.0	21.5	11.6	0.00423	42.7	42.6
	250	20.9	25.5	6.5	19.0	12.1	0.00297	37.7	37.6
	455	21.5	24.0	6.5	17.5	12.4	0.00221	34.7	34.7
13-Jan-09	1373	19.9	22.0	7.0	15.0	12.7	0.00131	29.8	29.7

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.00017**	d_{30} = **0.0014**	d_{50} = **0.0063**	d_{60} = **0.0093**	C_u = **55**	C_c = **1.2**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-LEP-03A-SG	**136259**	**Lean clay (CL)**		**Silty Clay Loam**	

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03B-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 328.56
Weight Passing #10 (g): 328.56
Weight Retained #10 (g): 0.00
Weight of Hydrometer Sample (g): 48.68
Calculated Weight of Sieve Sample (g): 48.68

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	328.56	100.00
	2"	50	0.00	0.00	328.56	100.00
	1.5"	38.1	0.00	0.00	328.56	100.00
	1"	25	0.00	0.00	328.56	100.00
	3/4"	19.0	0.00	0.00	328.56	100.00
	3/8"	9.5	0.00	0.00	328.56	100.00
	4	4.75	0.00	0.00	328.56	100.00
	10	2.00	0.00	0.00	328.56	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.03	0.03	48.65	99.94
	40	0.425	0.05	0.08	48.60	99.84
	60	0.250	0.09	0.17	48.51	99.65
	140	0.106	1.15	1.32	47.36	97.29
	200	0.075	2.10	3.42	45.26	92.97
	dry pan		0.21	3.63	45.05	
	wet pan			45.05	0.00	

d_{10} (mm): 0.0017
d_{16} (mm): 0.0047
d_{30} (mm): 0.011
d_{50} (mm): 0.021
d_{60} (mm): 0.028
d_{84} (mm): 0.056

Median Particle Diameter--d_{50} (mm): 0.021
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 16
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 2.5
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.027

Classification of fines: CL-ML

ASTM Soil Classification: Silty clay (CL-ML)
USDA Soil Classification: Silt Loam

Laboratory analysis by: K. Wright
Data entered by: T. Mendez
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 3-Nov-08
Start Time: 9:00

Type of Water Used: DISTILLED
Reaction with H_2O_2: NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

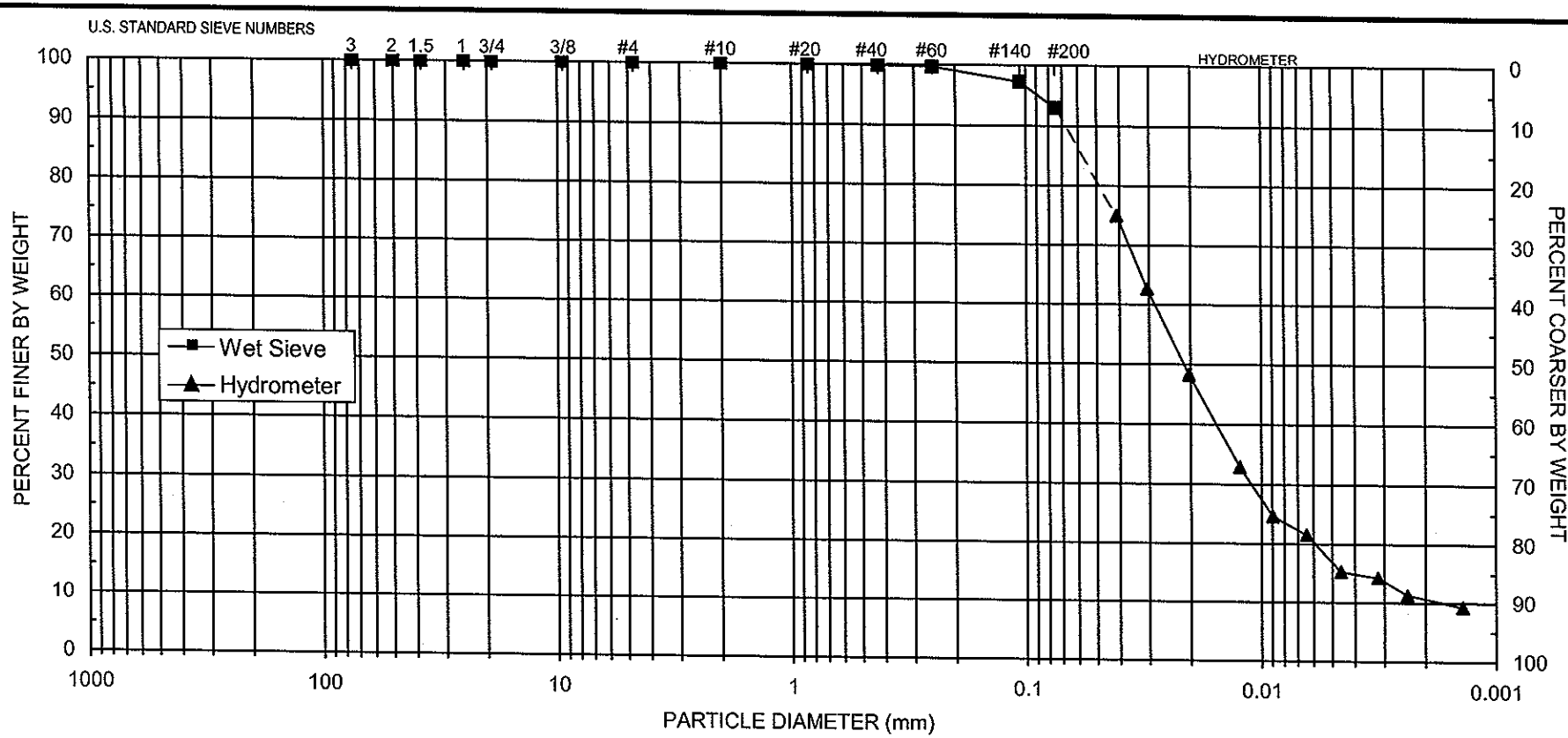
Initial Wt. (g): 48.68
Total Sample Wt. (g): 328.56
Wt. Passing #10 (g): 328.56

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
3-Nov-08	1	20.6	43.0	6.5	36.5	9.3	0.04113	75.0	75.0
	2	20.6	37.0	6.5	30.5	10.2	0.03059	62.7	62.7
	5	20.6	30.5	7.0	23.5	11.3	0.02033	48.3	48.3
	15	20.6	23.0	7.0	16.0	12.5	0.01236	32.9	32.9
	30	20.7	19.0	7.0	12.0	13.2	0.00895	24.7	24.7
	60	20.7	16.5	6.0	10.5	13.6	0.00643	21.6	21.6
	120	21.0	14.0	6.5	7.5	14.0	0.00460	15.4	15.4
	250	21.3	13.0	6.0	7.0	14.2	0.00319	14.4	14.4
	455	21.2	11.5	6.0	5.5	14.4	0.00239	11.3	11.3
4-Nov-08	1397	20.1	10.5	6.0	4.5	14.6	0.00139	9.2	9.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Barraza
Data entered by: T. Mendez
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.0017**	d_{30} = **0.011**	d_{50} = **0.021**	d_{60} = **0.028**	C_u = **16**	C_c = **2.5**

SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION	USDA CLASSIFICATION
OU4-LEP-03B-SG	**136259**	**Silty clay (CL-ML)**	**Silt Loam**

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05A-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 327.20
Weight Passing #10 (g): 326.92
Weight Retained #10 (g): 0.28
Weight of Hydrometer Sample (g): 52.19
Calculated Weight of Sieve Sample (g): 52.23

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	327.20	100.00
	2"	50	0.00	0.00	327.20	100.00
	1.5"	38.1	0.00	0.00	327.20	100.00
	1"	25	0.00	0.00	327.20	100.00
	3/4"	19.0	0.00	0.00	327.20	100.00
	3/8"	9.5	0.00	0.00	327.20	100.00
	4	4.75	0.28	0.28	326.92	99.91
	10	2.00	0.00	0.28	326.92	99.91
-10			(Based on calculated sieve wt.)			
	20	0.85	0.07	0.11	52.12	99.78
	40	0.425	0.06	0.17	52.06	99.67
	60	0.250	0.08	0.25	51.98	99.51
	140	0.106	0.13	0.38	51.85	99.26
	200	0.075	0.06	0.44	51.79	99.15
	dry pan		0.02	0.46	51.77	
	wet pan			51.77	0.00	

d_{10} (mm): 0.00016
d_{16} (mm): 0.00023
d_{30} (mm): 0.00062
d_{50} (mm): 0.0024
d_{60} (mm): 0.0036
d_{84} (mm): 0.0093

Median Particle Diameter --d_{50} (mm): 0.0024
Uniformity Coefficient, Cu --[d_{60}/d_{10}] (mm): 23
Coefficient of Curvature, Cc --[$(d_{30})^2/(d_{10}*d_{60})$] (mm): 0.67
Mean Particle Diameter --[$(d_{16}+d_{50}+d_{84})/3$] (mm): 0.0040

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Classification of fines: CH

ASTM Soil Classification: Fat clay (CH)
USDA Soil Classification: Silty Clay

Laboratory analysis by: K. Wright
Data entered by: T. Mendez
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 3-Nov-08
Start Time: 9:18

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

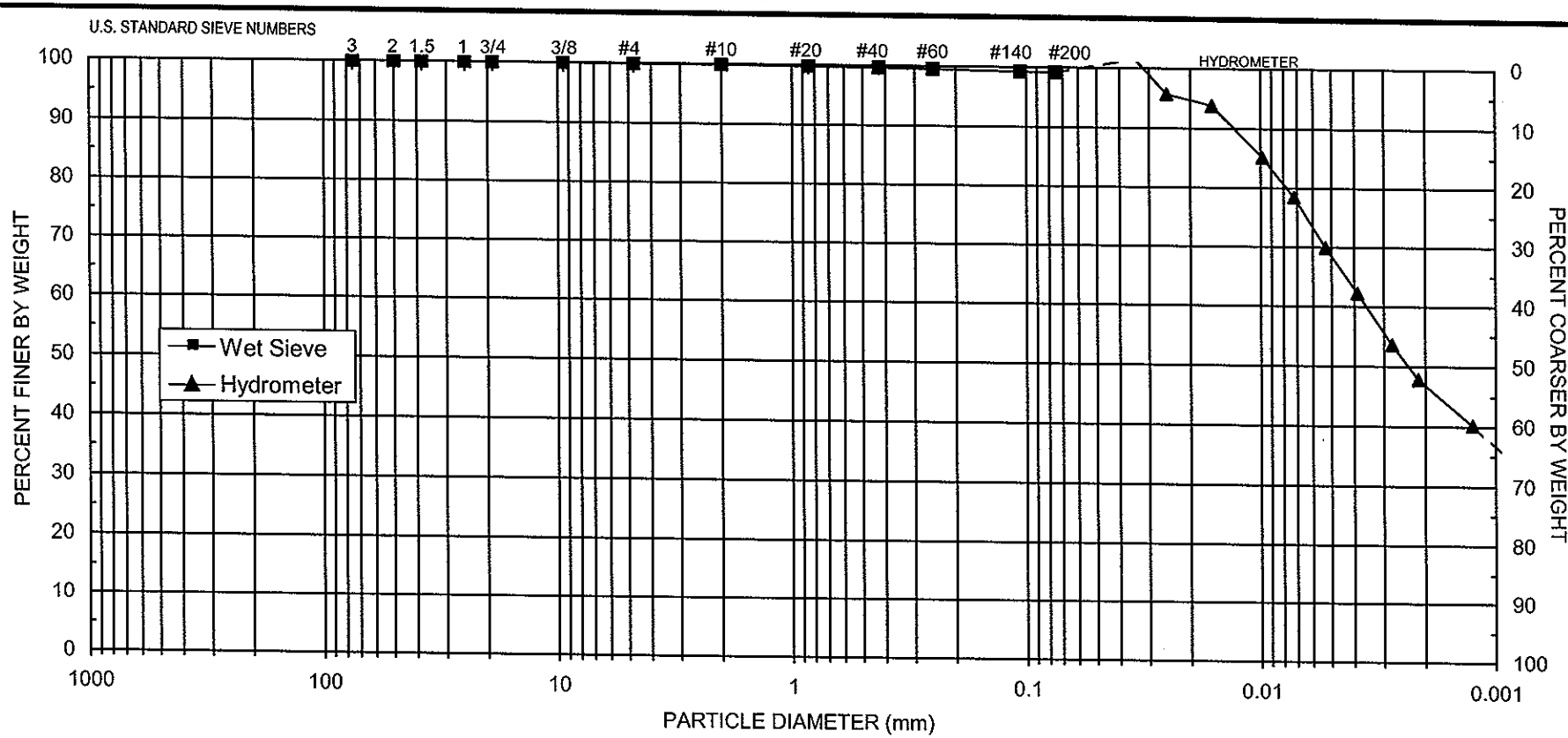
Initial Wt. (g): 52.19
Total Sample Wt. (g): 327.20
Wt. Passing #10 (g): 326.92

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
3-Nov-08	1	20.6	60.0**	7.0	53.0	6.5	0.03438	101.6	101.5
	2	20.6	57.0	7.0	50.0	7.0	0.02522	95.8	95.7
	5	20.6	56.0	7.0	49.0	7.1	0.01614	93.9	93.8
	15	20.7	51.0	6.5	44.5	7.9	0.00983	85.3	85.2
	30	20.7	47.0	6.0	41.0	8.6	0.00723	78.6	78.5
	60	20.7	43.0	6.5	36.5	9.3	0.00530	69.9	69.9
	120	21.0	38.5	6.0	32.5	10.0	0.00388	62.3	62.2
	250	21.3	34.5	6.5	28.0	10.6	0.00277	53.7	53.6
	442	21.2	31.0	6.0	25.0	11.2	0.00214	47.9	47.9
4-Nov-08	1389	20.1	27.0	6.0	21.0	11.9	0.00126	40.2	40.2

Comments:

* Dispersion device: mechanically operated stirring device
** Discontinuity in initial data points due to sample characteristics.

Laboratory analysis by: A. Barraza
Data entered by: T. Mendez
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.00016**	d_{30} = **0.00062**	d_{50} = **0.0024**	d_{60} = **0.0036**	C_u = **23**	C_c = **0.67**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-LEP-05A-SG	**136259**	**Fat clay (CH)**		**Silty Clay**	

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05B-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 349.16
Weight Passing #10 (g): 335.39
Weight Retained #10 (g): 13.77
Weight of Hydrometer Sample (g): 51.87
Calculated Weight of Sieve Sample (g): 54.00

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	349.16	100.00
	2"	50	0.00	0.00	349.16	100.00
	1.5"	38.1	0.00	0.00	349.16	100.00
	1"	25	0.00	0.00	349.16	100.00
	3/4"	19.0	0.00	0.00	349.16	100.00
	3/8"	9.5	0.00	0.00	349.16	100.00
	4	4.75	3.31	3.31	345.85	99.05
	10	2.00	10.46	13.77	335.39	96.06
-10			(Based on calculated sieve wt.)			
	20	0.85	1.99	4.12	49.88	92.37
	40	0.425	2.66	6.78	47.22	87.45
	60	0.250	5.35	12.13	41.87	77.54
	140	0.106	19.89	32.02	21.98	40.70
	200	0.075	4.45	36.47	17.53	32.46
	dry pan		0.21	36.68	17.32	
	wet pan			17.32	0.00	

d_{10} (mm): 0.0011
d_{16} (mm): 0.0037
d_{30} (mm): 0.045
d_{50} (mm): 0.13
d_{60} (mm): 0.17
d_{84} (mm): 0.35

Median Particle Diameter--d_{50} (mm): 0.13
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 155
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 11
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.16

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Classification of fines: CL

ASTM Soil Classification: Clayey sand (SC)
USDA Soil Classification: Sandy Loam

Laboratory analysis by: K. Wright
Data entered by: T. Mendez
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 4-Nov-08
Start Time: 9:18

Type of Water Used: DISTILLED
Reaction with H_2O_2: NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

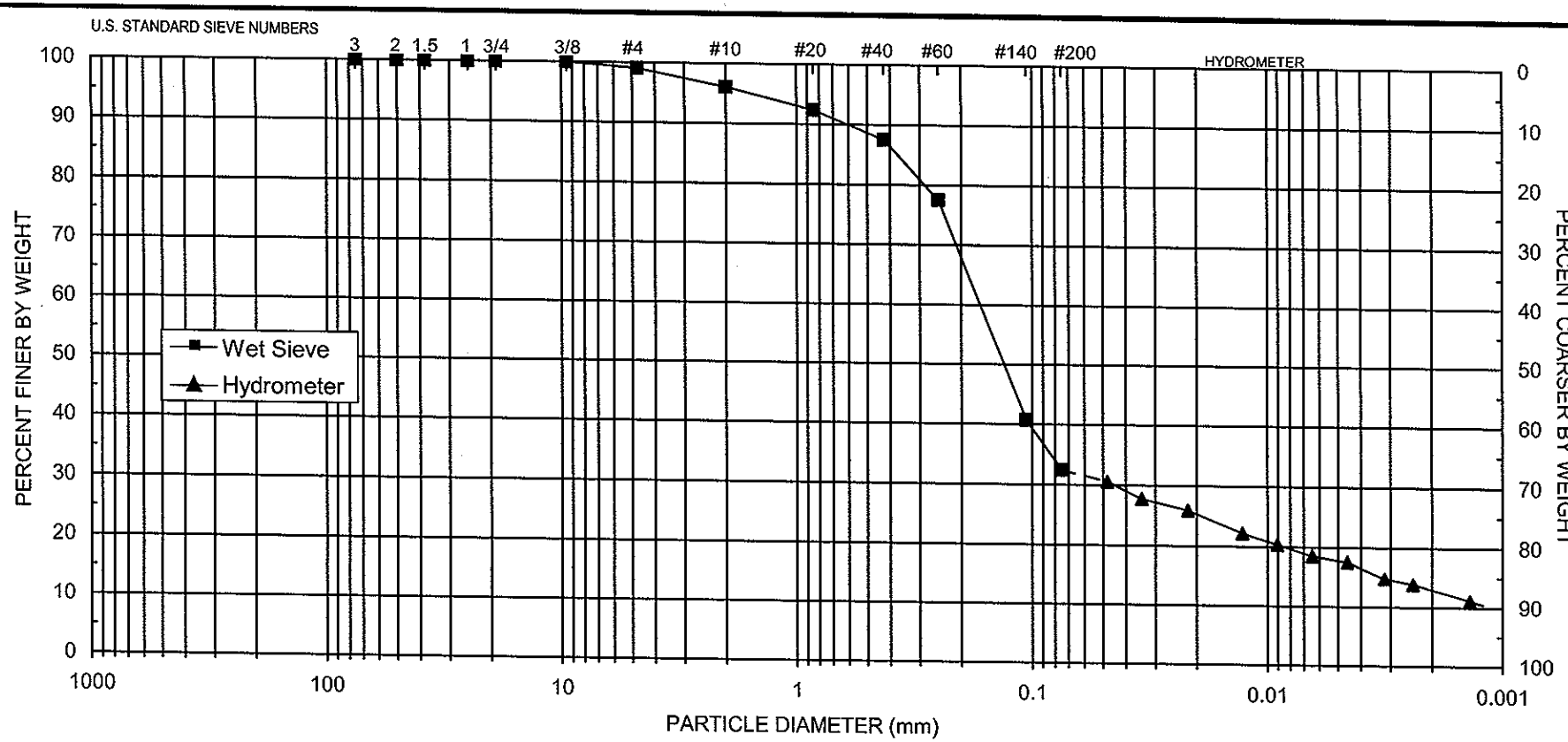
Initial Wt. (g): 51.87
Total Sample Wt. (g): 349.16
Wt. Passing #10 (g): 335.39

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
4-Nov-08	1	20.5	22.5	6.0	16.5	12.6	0.04808	31.8	30.6
	2	20.5	21.0	6.0	15.0	12.9	0.03433	28.9	27.8
	5	20.5	20.0	6.0	14.0	13.0	0.02185	27.0	25.9
	15	20.5	18.0	6.0	12.0	13.3	0.01277	23.1	22.2
	30	20.6	17.0	6.0	11.0	13.5	0.00908	21.2	20.4
	60	20.7	16.0	6.0	10.0	13.7	0.00645	19.3	18.5
	120	21.0	15.0	5.5	9.5	13.8	0.00457	18.3	17.6
	250	21.4	13.5	5.5	8.0	14.1	0.00318	15.4	14.8
	441	21.3	13.0	5.5	7.5	14.2	0.00240	14.5	13.9
5-Nov-08	1395	20.2	12.0	6.0	6.0	14.3	0.00138	11.6	11.1

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: T. Mendez
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.0011**	d_{30} = **0.045**	d_{50} = **0.13**	d_{60} = **0.17**	C_u = **155**	C_c = **11**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-LEP-05B-SG	**136259**	**Clayey sand (SC)**		**Sandy Loam**	

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07A-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 483.62
Weight Passing #10 (g): 377.28
Weight Retained #10 (g): 106.34
Weight of Hydrometer Sample (g): 53.13
Calculated Weight of Sieve Sample (g): 68.11

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	483.62	100.00
	2"	50	0.00	0.00	483.62	100.00
	1.5"	38.1	0.00	0.00	483.62	100.00
	1"	25	0.00	0.00	483.62	100.00
	3/4"	19.0	0.00	0.00	483.62	100.00
	3/8"	9.5	3.26	3.26	480.36	99.33
	4	4.75	25.41	28.67	454.95	94.07
	10	2.00	77.67	106.34	377.28	78.01
-10			(Based on calculated sieve wt.)			
	20	0.85	14.12	29.10	39.01	57.28
	40	0.425	9.53	38.63	29.48	43.29
	60	0.250	6.77	45.40	22.71	33.35
	140	0.106	10.02	55.42	12.69	18.63
	200	0.075	1.73	57.15	10.96	16.09
	dry pan		0.01	57.16	10.95	
	wet pan			10.95	0.00	

d_{10} (mm): 0.048
d_{16} (mm): 0.075
d_{30} (mm): 0.21
d_{50} (mm): 0.59
d_{60} (mm): 0.95
d_{84} (mm): 2.8

Median Particle Diameter--d_{50} (mm): 0.59
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 20
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 0.97
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 1.2

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand †

† Greater than 10% of sample is coarse material

Laboratory analysis by: K. Wright
Data entered by: T. Mendez
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 3-Nov-08
Start Time: 9:06

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

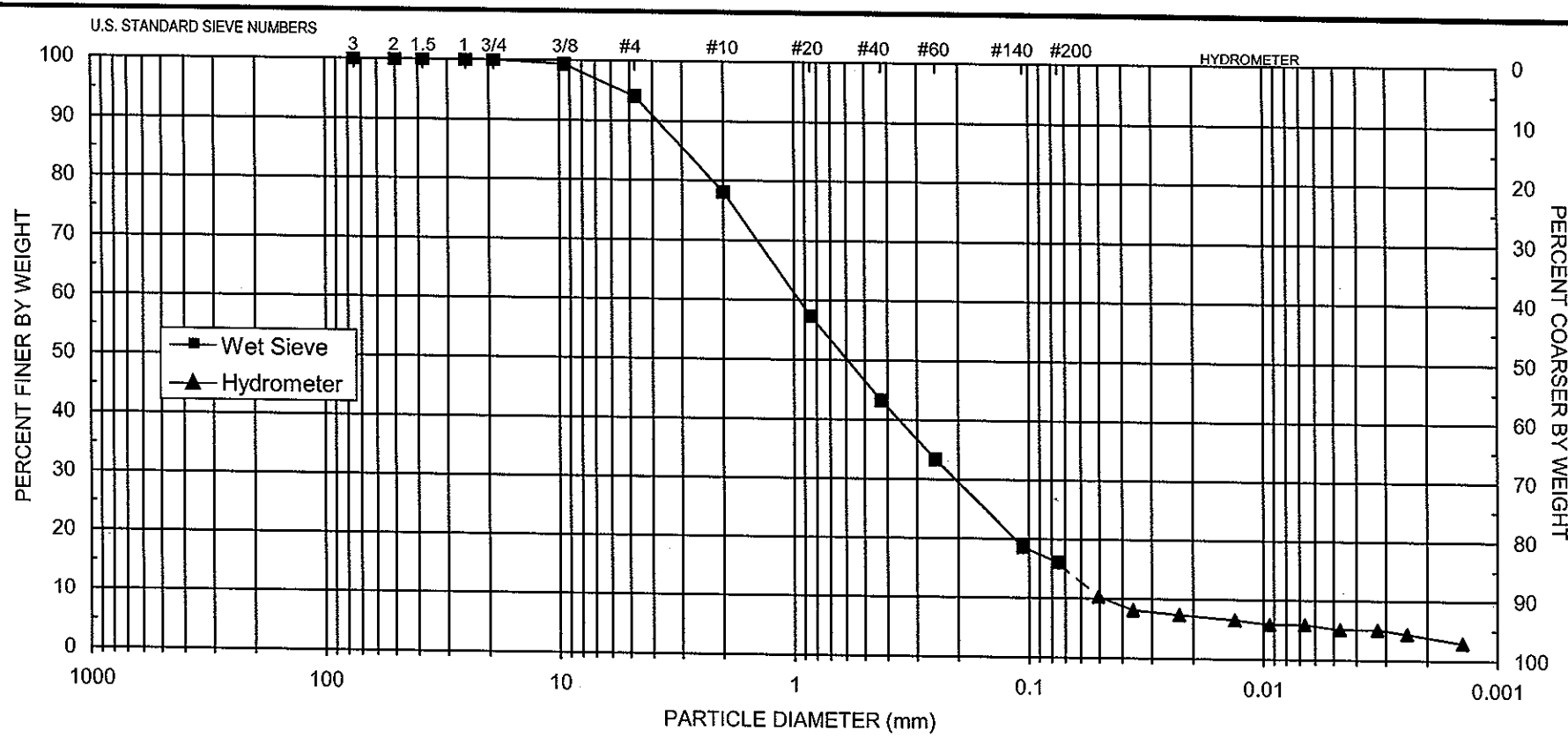
Initial Wt. (g)*:* 53.13
Total Sample Wt. (g)*:* 483.62
Wt. Passing #10 (g): 377.28

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
3-Nov-08	1	20.6	14.0	7.0	7.0	14.0	0.05060	13.2	10.3
	2	20.6	12.5	7.0	5.5	14.3	0.03610	10.4	8.1
	5	20.6	12.0	7.0	5.0	14.3	0.02289	9.4	7.3
	15	20.6	11.5	7.0	4.5	14.4	0.01326	8.5	6.6
	30	20.7	10.5	6.5	4.0	14.6	0.00941	7.5	5.9
	60	20.7	10.0	6.0	4.0	14.7	0.00668	7.5	5.9
	120	21.0	9.5	6.0	3.5	14.7	0.00472	6.6	5.1
	250	21.3	9.5	6.0	3.5	14.7	0.00326	6.6	5.1
	450	21.2	9.0	6.0	3.0	14.8	0.00244	5.6	4.4
4-Nov-08	1392	20.1	8.0	6.0	2.0	15.0	0.00141	3.8	2.9

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Barraza
Data entered by: T. Mendez
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.048**	d_{30} = **0.21**	d_{50} = **0.59**	d_{60} = **0.95**	C_u = **20**	C_c = **0.97**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-UEP-07A-SG	**136259**	**Silty sand (SM)**		**Loamy Sand †**	

† Greater than 10% of sample is coarse material

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07B-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 295.89
Weight Passing #10 (g): 271.61
Weight Retained #10 (g): 24.28
Weight of Hydrometer Sample (g): 50.31
Calculated Weight of Sieve Sample (g): 54.81

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	295.89	100.00
	2"	50	0.00	0.00	295.89	100.00
	1.5"	38.1	0.00	0.00	295.89	100.00
	1"	25	0.00	0.00	295.89	100.00
	3/4"	19.0	0.00	0.00	295.89	100.00
	3/8"	9.5	0.00	0.00	295.89	100.00
	4	4.75	5.46	5.46	290.43	98.15
	10	2.00	18.82	24.28	271.61	91.79
-10			(Based on calculated sieve wt.)			
	20	0.85	3.84	8.34	46.47	84.79
	40	0.425	3.62	11.96	42.85	78.18
	60	0.250	7.38	19.34	35.47	64.72
	140	0.106	13.77	33.11	21.70	39.59
	200	0.075	1.77	34.88	19.93	36.36
	dry pan		0.08	34.96	19.85	
	wet pan			19.85	0.00	

d_{10} (mm): 0.00045
d_{16} (mm): 0.0015
d_{30} (mm): 0.039
d_{50} (mm): 0.15
d_{60} (mm): 0.21
d_{84} (mm): 0.78

Median Particle Diameter--d_{50} (mm): 0.15
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 467
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 16
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.31

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Classification of fines: CL

ASTM Soil Classification: Clayey sand (SC)
USDA Soil Classification: Sandy Loam

Laboratory analysis by: K. Wright
Data entered by: T. Mendez
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 3-Nov-08
Start Time: 9:12

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

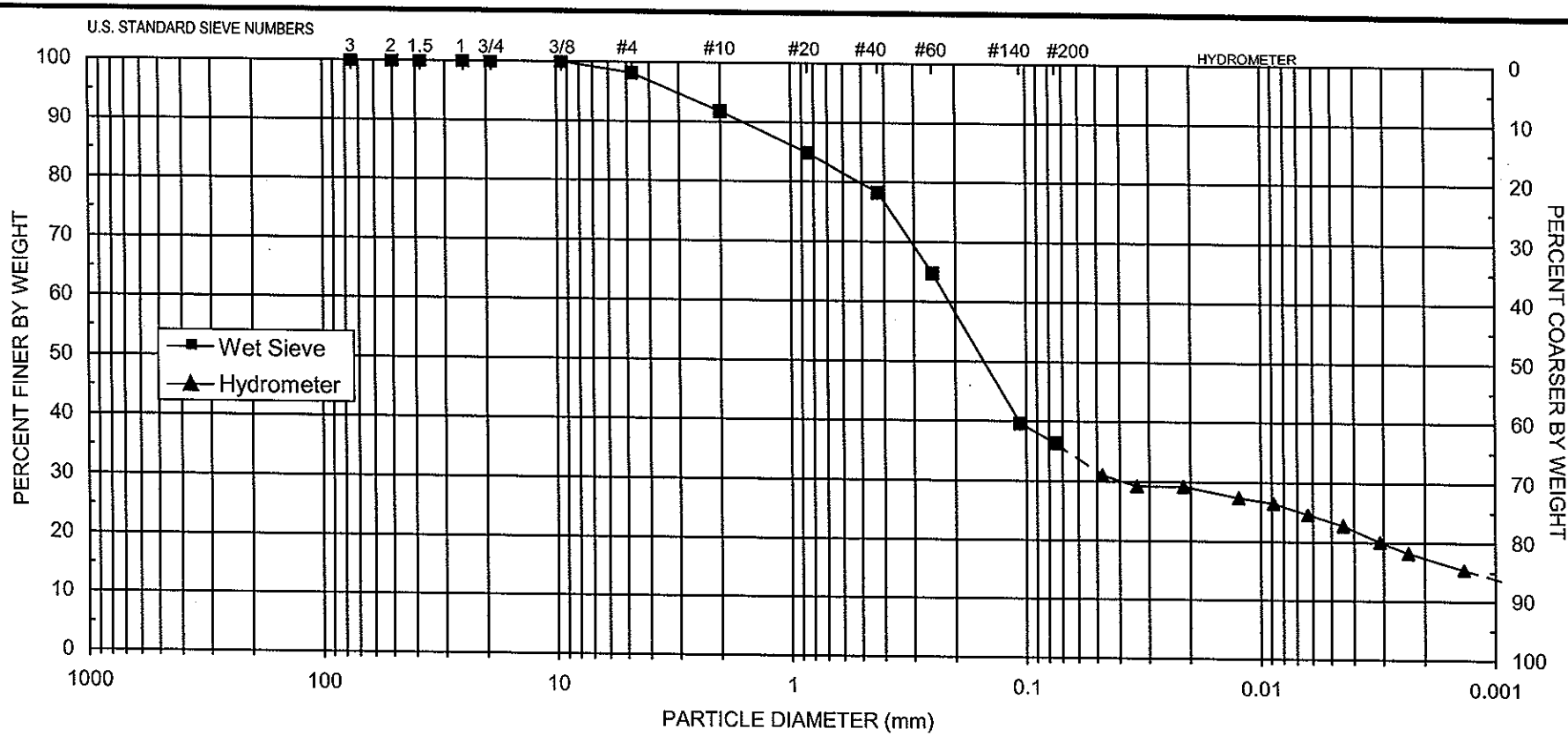
Initial Wt. (g)*:* 50.31
Total Sample Wt. (g)*:* 295.89
Wt. Passing #10 (g): 271.61

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
3-Nov-08	1	20.6	24.0	7.0	17.0	12.4	0.04755	33.8	31.0
	2	20.6	23.0	7.0	16.0	12.5	0.03385	31.8	29.2
	5	20.6	23.0	7.0	16.0	12.5	0.02141	31.8	29.2
	15	20.7	22.0	7.0	15.0	12.7	0.01242	29.8	27.4
	30	20.7	21.0	6.5	14.5	12.9	0.00884	28.8	26.5
	60	20.7	19.5	6.0	13.5	13.1	0.00631	26.8	24.6
	120	21.0	19.0	6.5	12.5	13.2	0.00446	24.8	22.8
	250	21.3	17.5	6.5	11.0	13.4	0.00311	21.9	20.1
	446	21.2	16.0	6.0	10.0	13.7	0.00235	19.9	18.2
4-Nov-08	1388	20.1	14.5	6.0	8.5	13.9	0.00136	16.9	15.5

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Barraza
Data entered by: T. Mendez
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL: Coarse, Fine		SAND: Coarse, Medium, Fine		SILT OR CLAY
USDA	COBBLES	GRAVEL	SAND: Very coarse, Coarse, Medium, Fine, Very fine			SILT / CLAY

d_{10} = **0.00045**	d_{30} = **0.039**	d_{50} = **0.15**	d_{60} = **0.21**	C_u = **467**	C_c = **16**

SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION	USDA CLASSIFICATION
OU4-UEP-07B-SG	**136259**	**Clayey sand (SC)**	**Sandy Loam**

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08A-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 356.39
Weight Passing #10 (g): 288.90
Weight Retained #10 (g): 67.49
Weight of Hydrometer Sample (g): 53.73
Calculated Weight of Sieve Sample (g): 66.28

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	356.39	100.00
	2"	50	0.00	0.00	356.39	100.00
	1.5"	38.1	0.00	0.00	356.39	100.00
	1"	25	0.00	0.00	356.39	100.00
	3/4"	19.0	0.00	0.00	356.39	100.00
	3/8"	9.5	0.00	0.00	356.39	100.00
	4	4.75	14.00	14.00	342.39	96.07
	10	2.00	53.49	67.49	288.90	81.06
-10			(Based on calculated sieve wt.)			
	20	0.85	17.60	30.15	36.13	54.51
	40	0.425	11.09	41.24	25.04	37.78
	60	0.250	8.51	49.75	16.53	24.94
	140	0.106	9.39	59.14	7.14	10.77
	200	0.075	0.96	60.10	6.18	9.32
	dry pan		0.06	60.16	6.12	
	wet pan			6.12	0.00	

d_{10} (mm): 0.088
d_{16} (mm): 0.15
d_{30} (mm): 0.31
d_{50} (mm): 0.71
d_{60} (mm): 1.0
d_{84} (mm): 2.4

Median Particle Diameter--d_{50} (mm): 0.71
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 11
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 1.1
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 1.1

Classification of fines (visual method): ML

ASTM Soil Classification: Well-graded sand with silt (SW-SM)
USDA Soil Classification: Sand †

† Greater than 10% of sample is coarse material

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 30-Dec-08
Start Time: 9:18

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

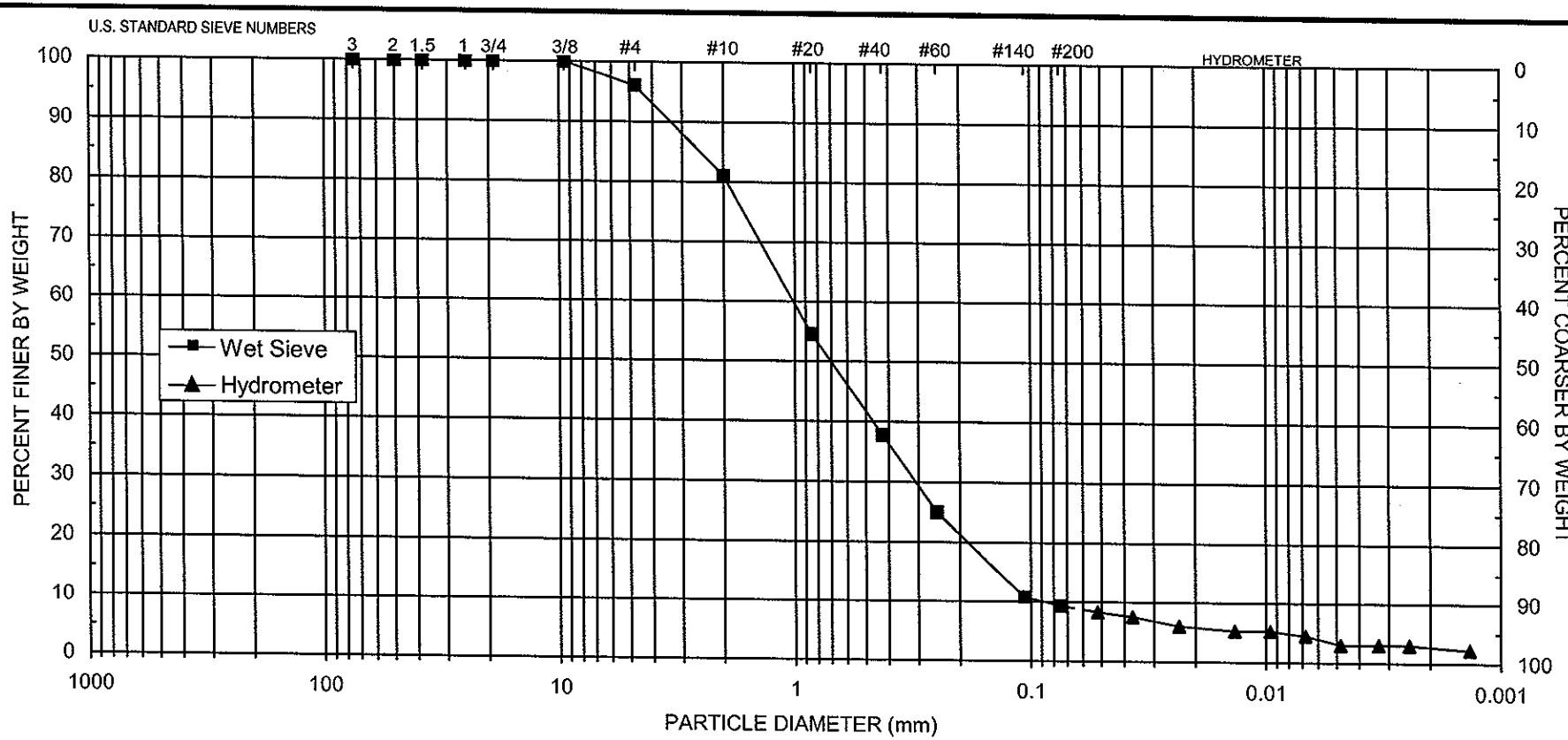
Initial Wt. (g): 53.73
Total Sample Wt. (g): 356.39
Wt. Passing #10 (g): 288.90

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Jan-09	1	19.1	12.5	7.0	5.5	14.3	0.05205	10.2	8.3
	2	19.1	12.0	7.0	5.0	14.3	0.03691	9.3	7.5
	5	19.1	11.0	7.0	4.0	14.5	0.02348	7.4	6.0
	15	19.2	10.5	7.0	3.5	14.6	0.01358	6.5	5.3
	30	19.2	10.5	7.0	3.5	14.6	0.00960	6.5	5.3
	60	19.4	10.0	7.0	3.0	14.7	0.00679	5.6	4.5
	120	19.5	9.0	7.0	2.0	14.8	0.00482	3.7	3.0
	250	20.2	8.5	6.5	2.0	14.9	0.00332	3.7	3.0
	444	21.3	8.5	6.5	2.0	14.9	0.00246	3.7	3.0
3-Jan-09	1514	19.3	9.5	8.0	1.5	14.7	0.00136	2.8	2.3

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.088**	d_{30} = **0.31**	d_{50} = **0.71**	d_{60} = **1.0**	C_u = **11**	C_c = **1.1**

SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION	USDA CLASSIFICATION
OU4-UEP-08A-SG	**136259**	**Well-graded sand with silt (SW-SM)**	**Sand †**

† Greater than 10% of sample is coarse material

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08B-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 30-Oct-08

Initial Dry Weight of Sample (g): 239.51
Weight Passing #10 (g): 239.51
Weight Retained #10 (g): 0.00
Weight of Hydrometer Sample (g): 45.13
Calculated Weight of Sieve Sample (g): 45.13

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	239.51	100.00
	2"	50	0.00	0.00	239.51	100.00
	1.5"	38.1	0.00	0.00	239.51	100.00
	1"	25	0.00	0.00	239.51	100.00
	3/4"	19.0	0.00	0.00	239.51	100.00
	3/8"	9.5	0.00	0.00	239.51	100.00
	4	4.75	0.00	0.00	239.51	100.00
	10	2.00	0.00	0.00	239.51	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.25	0.25	44.88	99.45
	40	0.425	2.03	2.28	42.85	94.95
	60	0.250	2.41	4.69	40.44	89.61
	140	0.106	6.90	11.59	33.54	74.32
	200	0.075	4.98	16.57	28.56	63.28
	dry pan		0.89	17.46	27.67	
	wet pan			27.67	0.00	

d_{10} (mm): 0.00076
d_{16} (mm): 0.0068
d_{30} (mm): 0.021
d_{50} (mm): 0.043
d_{60} (mm): 0.065
d_{84} (mm): 0.18

Median Particle Diameter --d_{50} (mm): 0.043
Uniformity Coefficient, Cu --$[d_{60}/d_{10}]$ (mm): 86
Coefficient of Curvature, Cc --$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 8.9
Mean Particle Diameter --$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.077

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Classification of fines: ML

ASTM Soil Classification: Sandy silt s(ML)
USDA Soil Classification: Loam

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 31-Dec-08
Start Time: 9:18

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

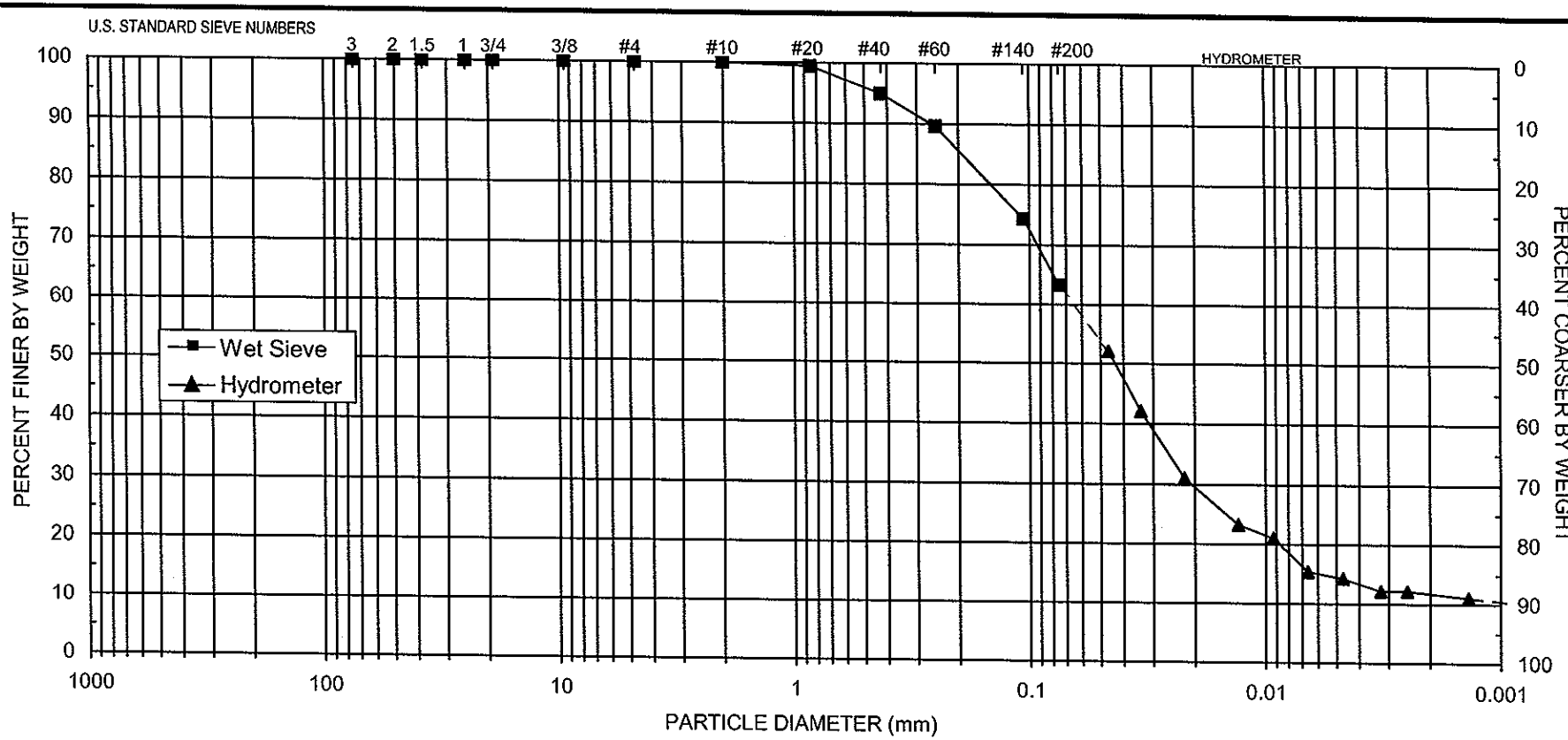
Initial Wt. (g)*:* 45.13
Total Sample Wt. (g)*:* 239.51
Wt. Passing #10 (g): 239.51

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
31-Dec-08	1	19.4	30.0	6.5	23.5	11.4	0.04634	52.1	52.1
	2	19.4	25.5	6.5	19.0	12.1	0.03381	42.1	42.1
	5	19.4	20.5	6.5	14.0	12.9	0.02210	31.0	31.0
	15	19.3	17.0	6.5	10.5	13.5	0.01305	23.3	23.3
	30	19.4	16.0	6.5	9.5	13.7	0.00927	21.1	21.1
	60	19.7	13.5	6.5	7.0	14.1	0.00663	15.5	15.5
	120	19.7	13.0	6.5	6.5	14.2	0.00470	14.4	14.4
	250	20.3	12.0	6.5	5.5	14.3	0.00325	12.2	12.2
	415	21.1	11.5	6.0	5.5	14.4	0.00251	12.2	12.2
1-Jan-09	1436	19.4	12.0	7.0	5.0	14.3	0.00137	11.1	11.1

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.00076**	d_{30} = **0.021**	d_{50} = **0.043**	d_{60} = **0.065**	C_u = **86**	C_c = **8.9**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-UEP-08B-SG	**136259**	**Sandy silt s(ML)**		**Loam**	

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Atterberg Limits/ Identification of Fines

Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
OU4-LEP-01A-SG	---	---	---	ML
OU4-LEP-01B-SG	---	---	---	ML
OU4-LEP-03A-SG	49	21	28	CL
OU4-LEP-03B-SG	25	20	5	CL-ML
OU4-LEP-05A-SG	81	23	58	CH
OU4-LEP-05B-SG	48	19	29	CL
OU4-UEP-07A-SG	---	---	---	ML
OU4-UEP-07B-SG	35	17	18	CL
OU4-UEP-08A-SG	---	---	---	ML
OU4-UEP-08B-SG	36	26	10	ML

--- = Soil requires visual-manual classification due to non-plasticity

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 24-Oct-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Classification (Visual Method): ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Data for Description and Identification of Fines
(Visual-Manual Procedure)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01A-SG
Ring Number: OU4-Phase I
Depth: 136259

Test Date: 24-Oct-08

Visual-manual classification of material passing the #40 sieve in lieu of Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Dark Gray (7.5YR 4/1)
Odor: None
Moisture Condition: Moist
HCl Reaction: None

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

**Note: The sample cements upon the addition of water.*

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 24-Oct-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Classification (Visual Method): ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Data for Description and Identification of Fines
(Visual-Manual Procedure)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-01B-SG
Ring Number: OU4-Phase I
Depth: 136259

Test Date: 24-Oct-08

Visual-manual classification of material passing the #40 sieve in lieu of Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Brown (7.5YR 4/3)
Odor: None
Moisture Condition: Moist
HCl Reaction: None

Preliminary Identification:

Dry Strength: Low
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

**Note: The sample cements upon the addition of water.*

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 8-Jan-09

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:	36	30	19
Pan number:	LL1	LL2	LL3
Weight of pan plus moist soil (g):	133.27	122.44	129.21
Weight of pan plus dry soil (g)	130.44	119.16	125.10
Weight of pan (g):	124.13	112.10	117.17
Gravimetric moisture content (% g/g):	44.85	46.46	51.83
Liquid Limit:	49		

Plastic Limit

	Trial 1	Trial 2
Pan number:	PL1	PL2
Weight of pan plus moist soil (g):	119.95	120.94
Weight of pan plus dry soil (g)	119.25	120.23
Weight of pan (g):	115.95	116.80
Gravimetric moisture content (% g/g):	21.21	20.70
Plastic Limit:	21	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: 49
Plastic Limit: 21
Plasticity Index: 28

Classification: CL

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-03B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 23-Oct-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:	35	24	15
Pan number:	LL1	LL2	LL3
Weight of pan plus moist soil (g):	130.10	130.92	143.18
Weight of pan plus dry soil (g)	127.51	127.08	137.91
Weight of pan (g):	117.00	112.02	117.87
Gravimetric moisture content (% g/g):	24.64	25.50	26.30
Liquid Limit:	25		

Plastic Limit

	Trial 1	Trial 2
Pan number:	PL1	PL2
Weight of pan plus moist soil (g):	122.62	124.21
Weight of pan plus dry soil (g)	121.41	122.97
Weight of pan (g):	115.36	116.80
Gravimetric moisture content (% g/g):	20.00	20.10
Plastic Limit:	20	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: 25
Plastic Limit: 20
Plasticity Index: 5

Classification: CL-ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 23-Oct-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:	36	25	18
Pan number:	LL1	LL2	LL3
Weight of pan plus moist soil (g):	125.42	140.50	135.69
Weight of pan plus dry soil (g)	122.19	130.19	126.99
Weight of pan (g):	118.00	117.46	116.54
Gravimetric moisture content (% g/g):	77.09	80.99	83.25
Liquid Limit:	81		

Plastic Limit

	Trial 1	Trial 2
Pan number:	PL1	PL2
Weight of pan plus moist soil (g):	123.01	117.59
Weight of pan plus dry soil (g)	122.06	116.79
Weight of pan (g):	117.84	113.29
Gravimetric moisture content (% g/g):	22.51	22.86
Plastic Limit:	23	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: 81
Plastic Limit: 23
Plasticity Index: 58

Classification: CH

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-LEP-05B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 24-Oct-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:	36	27	19
Pan number:	LL1	LL2	LL3
Weight of pan plus moist soil (g):	132.93	135.49	137.09
Weight of pan plus dry soil (g)	127.99	129.86	130.57
Weight of pan (g):	117.00	117.98	117.87
Gravimetric moisture content (% g/g):	44.95	47.39	51.34
Liquid Limit:	48		

Plastic Limit

	Trial 1	Trial 2
Pan number:	PL1	PL2
Weight of pan plus moist soil (g):	125.35	115.45
Weight of pan plus dry soil (g)	124.15	114.17
Weight of pan (g):	117.84	107.58
Gravimetric moisture content (% g/g):	19.02	19.42
Plastic Limit:	19	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: 48
Plastic Limit: 19
Plasticity Index: 29

Classification: CL

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 23-Oct-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Classification (Visual Method): ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Data for Description and Identification of Fines
(Visual-Manual Procedure)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07A-SG
Ring Number: OU4-Phase I
Depth: 136259

Test Date: 23-Oct-08

Visual-manual classification of material passing the #40 sieve in lieu of Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Dark Yellowish Brown (10YR 4/4)
Odor: None
Moisture Condition: Moist
HCl Reaction: None

Preliminary Identification:

Dry Strength: Medium
Dilatency: Slow
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

**Note: The sample cements upon the addition of water.*

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-07B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 24-Oct-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:	34	27	19
Pan number:	LL1	LL2	LL3
Weight of pan plus moist soil (g):	132.22	137.96	133.53
Weight of pan plus dry soil (g)	128.77	132.78	127.99
Weight of pan (g):	118.36	117.46	112.66
Gravimetric moisture content (% g/g):	33.14	33.81	36.14
Liquid Limit:	35		

Plastic Limit

	Trial 1	Trial 2
Pan number:	PL1	PL2
Weight of pan plus moist soil (g):	119.41	119.76
Weight of pan plus dry soil (g)	118.38	118.80
Weight of pan (g):	112.27	113.29
Gravimetric moisture content (% g/g):	16.86	17.42
Plastic Limit:	17	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: 35
Plastic Limit: 17
Plasticity Index: 18

Classification: CL

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 23-Oct-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Classification (Visual Method): ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Data for Description and Identification of Fines
(Visual-Manual Procedure)

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08A-SG
Ring Number: OU4-Phase I
Depth: 136259

Test Date: 23-Oct-08

Visual-manual classification of material passing the #40 sieve in lieu of Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Light Olive Brown (2.5Y 5/4)
Odor: None
Moisture Condition: Moist
HCl Reaction: None

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

**Note: The sample cements upon the addition of water.*

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0184.00
Sample Number: OU4-UEP-08B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 24-Oct-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:	35	24	18
Pan number:	LL1	LL2	LL3
Weight of pan plus moist soil (g):	135.56	128.95	125.98
Weight of pan plus dry soil (g)	131.10	125.87	122.19
Weight of pan (g):	117.90	117.47	112.31
Gravimetric moisture content (% g/g):	33.79	36.67	38.36
Liquid Limit:	36		

Plastic Limit

	Trial 1	Trial 2
Pan number:	PL1	PL2
Weight of pan plus moist soil (g):	121.73	117.09
Weight of pan plus dry soil (g)	120.87	116.17
Weight of pan (g):	117.47	112.61
Gravimetric moisture content (% g/g):	25.29	25.84
Plastic Limit:	26	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: 36
Plastic Limit: 26
Plasticity Index: 10

Classification: ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Laboratory Tests and Methods

Tests and Methods

Dry Bulk Density:	ASTM D6836
Moisture Content:	ASTM D2216; ASTM D6836
Calculated Porosity:	ASTM D6836
Saturated Hydraulic Conductivity:	
Constant Head: (Rigid Wall)	ASTM D 2434 (modified apparatus)
Falling Head: (Rigid Wall)	Klute, A. and C. Dirkson. 1986. Hydraulic Conductivity and Diffusivity: Laboratory Methods.Chp. 28, pp. 200-203, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Hanging Column Method:	ASTM D6836; Klute, A. 1986. Porosity. Chp.26, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Pressure Plate Method:	ASTM D6836; ASTM D2325
Water Potential (Dewpoint Potentiometer) Method:	ASTM D6836; Rawlins, S.L. and G.S. Campbell, 1986. Water Potential: Thermocouple Psychrometry. Chp. 24, pp. 597-619, in A. Klute (ed.), Methods of Soil Analysis, Part 1. American Society of Agronomy, Madison, WI.
Relative Humidity (Box) Method:	Karathanasis & Hajek. 1982. Quantitative Evaluation of Water Adsorption on Soil Clays.SSA Journal 46:1321-1325; Campbell, G. and G. Gee. 1986. Water Potential: Miscellaneous Methods.Chp. 25, pp. 631-632, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Moisture Retention Characteristics & Calculated Unsaturated Hydraulic Conductivity:	ASTM D6836; van Genuchten, M.T. 1980. A closed-form equation for predicting the hydraulic conductivity of unsaturated soils. SSSAJ 44:892-898; van Genuchten, M.T., F.J. Leij, and S.R. Yates. 1991. The RETC code for quantifying the hydraulic functions of unsaturated soils. Robert S. Kerr Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Ada, Oklahoma. EPA/600/2091/065. December 1991
Atterberg Limits:	ASTM D4318
Visual-Manual Description:	ASTM D2488

Laboratory Report for

Brown and Caldwell

Samples: OU4-LEP-10,13,15

Project: #136259, OU4-Phase I

January 20, 2009

Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109

January 20, 2009

Ms. Penny Bassett
Brown and Caldwell
3264 Goni Road Suite 153
Carson City, NV 89706
(775) 883-4118

Re: DBS&A Laboratory Report for Brown and Caldwell (Project: OU4-Phase I 136259)

Dear Ms. Bassett

Enclosed is the report for the Brown and Caldwell (Project: OU4-Phase I 136259) samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed final report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the final report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to Brown and Caldwell and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
LABORATORY / TESTING FACILITY

Ryan Marshall
Assistant Laboratory Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
6020 Academy Rd., NE, Suite 100 505-822-9400
Albuquerque, NM 87109-3315 FAX 505-822-8877

Summaries

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties[1]		Saturated Hydraulic Conductivity[2]			Moisture Characteristics[3]								Particle Size[4]			Specific Gravity[5]		Air Perm-eability	Atterberg Limits	Proctor Compaction
	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K_{unsat}	DS	WS	H	F	C			
OU4-LEP-10A-SG	X			X		X	X		X	X			X		X	X				X	
OU4-LEP-10B-SG	X			X		X	X		X	X			X		X	X				X	
OU4-FEP-13A-SG	X			X		X	X		X	X			X		X	X				X	
OU4-FEP-13B-SG	X			X		X	X		X	X			X		X	X				X	
OU4-FEP-15A-SG	X		X			X	X		X	X			X		X	X				X	
OU4-FEP-15B-SG	X		X			X	X		X	X			X		X	X				X	
OU4-FEP-15I-SG	X																				

[1] VM = Volume Measurement Method, VD = Volume Displacement Method

[2] CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

[3] HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, Kunsat = Calculated Unsaturated Hydraulic Conductivity

[4] DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

[5] F = Fine (<4.75mm), C = Coarse (>4.75mm)

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Moisture Content				Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)			
OU4-LEP-10A-SG	22.6*	38.0	---	---	1.68	2.06	36.5
OU4-LEP-10B-SG	23.3	40.2	---	---	1.73	2.13	34.8
OU4-FEP-13A-SG	12.9	22.7	---	---	1.75	1.98	33.8
OU4-FEP-13B-SG	17.8	33.0	---	---	1.85	2.18	30.1
OU4-FEP-15A-SG	12.0*	21.9	---	---	1.83	2.04	31.1
OU4-FEP-15B-SG	15.5	25.4	---	---	1.64	1.90	38.0

NA = Not analyzed

--- = This sample was not remolded

* Calculated based on subsample.

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Moisture Content				Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)			
OU4-LEP-10A-SG	22.6	NA	---	---	NA	NA	NA
OU4-LEP-10B-SG	17.6	NA	---	---	NA	NA	NA
OU4-FEP-13A-SG	13.7	NA	---	---	NA	NA	NA
OU4-FEP-13B-SG	15.8	NA	---	---	NA	NA	NA
OU4-FEP-15A-SG	12.0	NA	---	---	NA	NA	NA
OU4-FEP-15B-SG	11.7	NA	---	---	NA	NA	NA
OU4-FEP-15I-SG	6.9	12.5	---	---	1.81	1.93	31.7

NA = Not analyzed

--- = This sample was not remolded

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversize Corrected K_{sat} (cm/sec)	Method of Analysis	
			Constant Head	Falling Head
OU4-LEP-10A-SG	5.0E-08	NA		X
OU4-LEP-10B-SG	8.4E-08	NA		X
OU4-FEP-13A-SG	5.3E-06	NA		X
OU4-FEP-13B-SG	1.1E-06	NA		X
OU4-FEP-15A-SG	7.1E-05	NA	X	
OU4-FEP-15B-SG	1.6E-04	NA	X	

Summary of Moisture Characteristics of the Initial Drainage Curve

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-LEP-10A-SG	0	43.9 ‡‡
	52	43.4 ‡‡
	142	43.2 ‡‡
	337	40.5 ‡‡
	1530	40.1 ‡‡
	263108	10.7 ‡‡
	851293	9.9 ‡‡
OU4-LEP-10B-SG	0	41.2 ‡‡
	57	41.5 ‡‡
	129	39.5
	337	39.2
	1530	38.3
	40792	14.7
	103000	9.1
	851293	6.2
OU4-FEP-13A-SG	0	31.6
	55	27.7
	98	25.7
	206	23.1
	449	20.9
	36611	10.1
	145831	8.3
	851293	5.2
OU4-FEP-13B-SG	0	33.9
	48	33.2
	118	32.0
	217	30.8
	449	29.1
	26311	10.3
	400781	5.9
	851293	5.3

‡‡ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-FEP-15A-SG	0	30.7
	16	30.3
	59	27.7
	126	26.6
	449	25.4
	169287	10.3
	851293	5.1
OU4-FEP-15B-SG	0	42.1
	7	39.6
	38	29.9
	100	26.6
	449	23.4
	42322	10.2
	235574	6.7
	851293	4.7

‡‡ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Calculated Unsaturated Hydraulic Properties

Sample Number	α (cm^{-1})	N (dimensionless)	θ_r (% vol)	θ_s (% vol)	Oversize Corrected θ_r (% vol)	Oversize Corrected θ_s (% vol)
OU4-LEP-10A-SG	0.0004	1.2775	0.00	43.12	NA	NA
OU4-LEP-10B-SG	0.0003	1.4006	0.00	40.67	NA	NA
OU4-FEP-13A-SG	0.0267	1.1680	0.00	31.63	NA	NA
OU4-FEP-13B-SG	0.0021	1.3563	3.15	33.50	NA	NA
OU4-FEP-15A-SG	0.0053	1.1771	0.00	29.88	NA	NA
OU4-FEP-15B-SG	0.1328	1.1702	0.00	42.45	NA	NA

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed

Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification	
OU4-LEP-10A-SG	7.2E-05	0.0027	0.0054	75	0.81	WS/H	Fat clay with sand (CH)s	Clay	(Est)
OU4-LEP-10B-SG	0.0010	0.011	0.027	27	0.85	WS/H	Sandy lean clay s(CL)	Loam	(Est)
OU4-FEP-13A-SG	0.036	0.22	0.31	8.6	1.3	WS/H	Silty sand (SM)	Sand †	
OU4-FEP-13B-SG	0.0095	0.26	0.47	49	3.2	WS/H	Silty sand (SM)	Sandy Loam †	
OU4-FEP-15A-SG	0.021	0.41	0.64	30	2.2	WS/H	Silty sand (SM)	Loamy Sand †	
OU4-FEP-15B-SG	0.022	0.51	0.89	40	1.3	WS/H	Silty sand with gravel (SM)g	Loamy Sand †	

d_{50} = Median particle diameter

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
OU4-LEP-10A-SG	50	18	32	CH
OU4-LEP-10B-SG	27	15	12	CL
OU4-FEP-13A-SG	---	---	---	ML
OU4-FEP-13B-SG	---	---	---	ML
OU4-FEP-15A-SG	---	---	---	ML
OU4-FEP-15B-SG	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory Data and Graphical Plots

Initial Properties

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Moisture Content				Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)			
OU4-LEP-10A-SG	22.6*	38.0	---	---	1.68	2.06	36.5
OU4-LEP-10B-SG	23.3	40.2	---	---	1.73	2.13	34.8
OU4-FEP-13A-SG	12.9	22.7	---	---	1.75	1.98	33.8
OU4-FEP-13B-SG	17.8	33.0	---	---	1.85	2.18	30.1
OU4-FEP-15A-SG	12.0*	21.9	---	---	1.83	2.04	31.1
OU4-FEP-15B-SG	15.5	25.4	---	---	1.64	1.90	38.0

NA = Not analyzed

--- = This sample was not remolded

* Calculated based on subsample.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	115.30**	
Tare weight, ring (g):	31.20	
Tare weight, pan/plate (g):	27.14	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	46.46	
Sample volume (cm^3):	27.60	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	22.6	
Volumetric Moisture Content (% vol):	38.0	
Dry bulk density (g/cm^3):	1.68	
Wet bulk density (g/cm^3):	2.06	
Calculated Porosity (% vol):	36.5	
Percent Saturation:	104.2	

Laboratory analysis by: K. Wright
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded
** Calculated based on subsample.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	129.46	
Tare weight, ring (g):	35.22	
Tare weight, pan/plate (g):	32.21	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	50.32	
Sample volume (cm^3):	29.12	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	23.3	
Volumetric Moisture Content (% vol):	40.2	
Dry bulk density (g/cm^3):	1.73	
Wet bulk density (g/cm^3):	2.13	
Calculated Porosity (% vol):	34.8	
Percent Saturation:	115.5	

Laboratory analysis by: K. Wright
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	109.46	
Tare weight, ring (g):	7.56	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	90.23	
Sample volume (cm^3):	51.46	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	12.9	
Volumetric Moisture Content (% vol):	22.7	
Dry bulk density (g/cm^3):	1.75	
Wet bulk density (g/cm^3):	1.98	
Calculated Porosity (% vol):	33.8	
Percent Saturation:	67.0	

Laboratory analysis by: K. Wright
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	104.69	
Tare weight, ring (g):	6.30	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	83.49	
Sample volume (cm^3):	45.10	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	17.8	
Volumetric Moisture Content (% vol):	33.0	
Dry bulk density (g/cm^3):	1.85	
Wet bulk density (g/cm^3):	2.18	
Calculated Porosity (% vol):	30.1	
Percent Saturation:	109.6	

Laboratory analysis by: K. Wright
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	218.72**	
Tare weight, ring (g):	50.69	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	150.01	
Sample volume (cm^3):	82.18	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	12.0	
Volumetric Moisture Content (% vol):	21.9	
Dry bulk density (g/cm^3):	1.83	
Wet bulk density (g/cm^3):	2.04	
Calculated Porosity (% vol):	31.1	
Percent Saturation:	70.5	

Laboratory analysis by: K. Wright
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded
** Calculated based on subsample.

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	176.93	
Tare weight, ring (g):	43.35	
Tare weight, pan/plate (g):	0.00	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	115.69	
Sample volume (cm^3):	70.45	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	15.5	
Volumetric Moisture Content (% vol):	25.4	
Dry bulk density (g/cm^3):	1.64	
Wet bulk density (g/cm^3):	1.90	
Calculated Porosity (% vol):	38.0	
Percent Saturation:	66.8	

Laboratory analysis by: K. Wright
Data entered by: D. O'Dowd
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

As Received Moisture Content

Summary of Initial Moisture Content, Dry Bulk Density Wet Bulk Density and Calculated Porosity

Sample Number	Moisture Content				Dry Bulk Density (g/cm^3)	Wet Bulk Density (g/cm^3)	Calculated Porosity (%)
	As Received		Remolded				
	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)	Gravimetric (%, g/g)	Volumetric (%, cm^3/cm^3)			
OU4-LEP-10A-SG	22.6	NA	---	---	NA	NA	NA
OU4-LEP-10B-SG	17.6	NA	---	---	NA	NA	NA
OU4-FEP-13A-SG	13.7	NA	---	---	NA	NA	NA
OU4-FEP-13B-SG	15.8	NA	---	---	NA	NA	NA
OU4-FEP-15A-SG	12.0	NA	---	---	NA	NA	NA
OU4-FEP-15B-SG	11.7	NA	---	---	NA	NA	NA
OU4-FEP-15I-SG	6.9	12.5	---	---	1.81	1.93	31.7

NA = Not analyzed

--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	335.49	
Tare weight, ring (g):	0.00	
Tare weight, pan/plate (g):	268.23	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	54.86	
Sample volume (cm^3):	NA	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	22.6	
Volumetric Moisture Content (% vol):	NA	
Dry bulk density (g/cm^3):	NA	
Wet bulk density (g/cm^3):	NA	
Calculated Porosity (% vol):	NA	
Percent Saturation:	NA	

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	366.57	
Tare weight, ring (g):	0.00	
Tare weight, pan/plate (g):	297.83	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	58.44	
Sample volume (cm^3):	NA	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	17.6	
Volumetric Moisture Content (% vol):	NA	
Dry bulk density (g/cm^3):	NA	
Wet bulk density (g/cm^3):	NA	
Calculated Porosity (% vol):	NA	
Percent Saturation:	NA	

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	428.70	
Tare weight, ring (g):	0.00	
Tare weight, pan/plate (g):	292.86	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	119.45	
Sample volume (cm^3):	NA	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	13.7	
Volumetric Moisture Content (% vol):	NA	
Dry bulk density (g/cm^3):	NA	
Wet bulk density (g/cm^3):	NA	
Calculated Porosity (% vol):	NA	
Percent Saturation:	NA	

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	393.30	
Tare weight, ring (g):	0.00	
Tare weight, pan/plate (g):	289.51	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	89.60	
Sample volume (cm^3):	NA	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	15.8	
Volumetric Moisture Content (% vol):	NA	
Dry bulk density (g/cm^3):	NA	
Wet bulk density (g/cm^3):	NA	
Calculated Porosity (% vol):	NA	
Percent Saturation:	NA	

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15A-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	508.51	
Tare weight, ring (g):	0.00	
Tare weight, pan/plate (g):	270.25	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	212.71	
Sample volume (cm^3):	NA	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	12.0	
Volumetric Moisture Content (% vol):	NA	
Dry bulk density (g/cm^3):	NA	
Wet bulk density (g/cm^3):	NA	
Calculated Porosity (% vol):	NA	
Percent Saturation:	NA	

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15B-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	654.01	
Tare weight, ring (g):	0.00	
Tare weight, pan/plate (g):	268.69	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	345.10	
Sample volume (cm^3):	NA	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	11.7	
Volumetric Moisture Content (% vol):	NA	
Dry bulk density (g/cm^3):	NA	
Wet bulk density (g/cm^3):	NA	
Calculated Porosity (% vol):	NA	
Percent Saturation:	NA	

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Data for Initial Moisture Content, Bulk Density, Porosity, and Percent Saturation

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15I-SG
Project Name: OU4-Phase I
Project Number: 136259

	As Received	Remolded
Test Date:	12-Nov-08	---
Field weight of sample* (g):	535.56	
Tare weight, ring (g):	0.00	
Tare weight, pan/plate (g):	267.59	
Tare weight, other (g):	0.00	
Dry weight of sample (g):	250.69	
Sample volume (cm^3):	138.58	
Assumed particle density (g/cm^3):	2.65	
Gravimetric Moisture Content (% g/g):	6.9	
Volumetric Moisture Content (% vol):	12.5	
Dry bulk density (g/cm^3):	1.81	
Wet bulk density (g/cm^3):	1.93	
Calculated Porosity (% vol):	31.7	
Percent Saturation:	39.3	

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Comments:

* Weight including tares
NA = Not analyzed
--- = This sample was not remolded

Saturated Hydraulic Conductivity

Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversize Corrected K_{sat} (cm/sec)	Method of Analysis	
			Constant Head	Falling Head
OU4-LEP-10A-SG	5.0E-08	NA		X
OU4-LEP-10B-SG	8.4E-08	NA		X
OU4-FEP-13A-SG	5.3E-06	NA		X
OU4-FEP-13B-SG	1.1E-06	NA		X
OU4-FEP-15A-SG	7.1E-05	NA	X	
OU4-FEP-15B-SG	1.6E-04	NA	X	

Saturated Hydraulic Conductivity
Falling Head Method

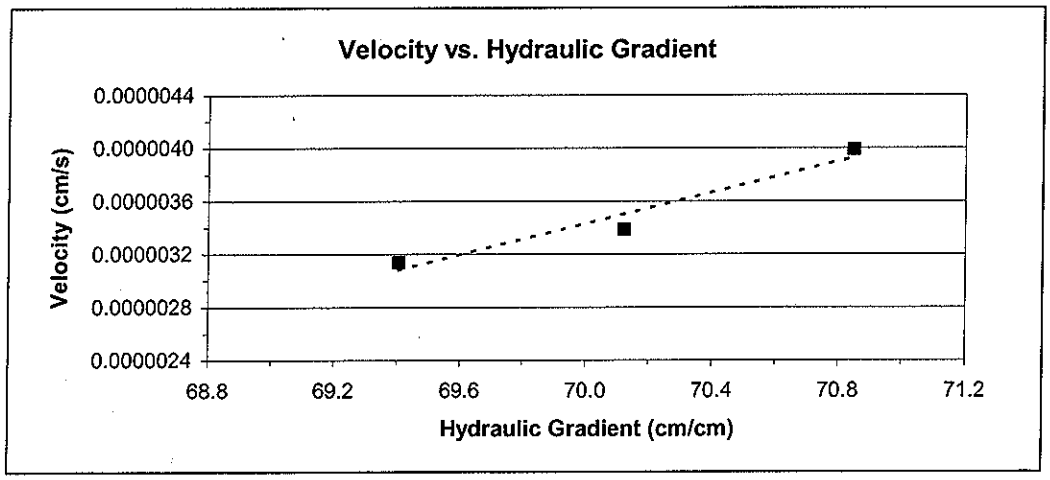
Job name: Brown and Caldwell
Job number: LB08.0201.00
Sample number: OU4-LEP-10A-SG
Project Name: OU4-Phase I
Project Number: 136259

Type of water used: TAP
Backpressure (psi): 1.2
Offset (cm): 2.4
Sample length (cm): 2.72
Sample x-sectional area (cm^2): 10.14
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
19-Nov-08	10:40:25	19.5	111.0	193.0	6917	5.6E-08	5.6E-08
19-Nov-08	12:35:42	20.0	110.6	192.6			
Test # 2:							
19-Nov-08	12:35:42	20.0	110.6	192.6	72333	4.8E-08	4.8E-08
20-Nov-08	08:41:15	19.5	107.1	189.0			
Test # 3:							
20-Nov-08	08:41:15	19.5	107.1	189.0	7695	4.5E-08	4.5E-08
20-Nov-08	10:49:30	20.0	106.7	188.7			

***Average Ksat* (cm/sec):** **5.0E-08**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:
--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Brown and Caldwell
Job number: LB08.0201.00
Sample number: OU4-LEP-10B-SG
Project Name: OU4-Phase I
Project Number: 136259

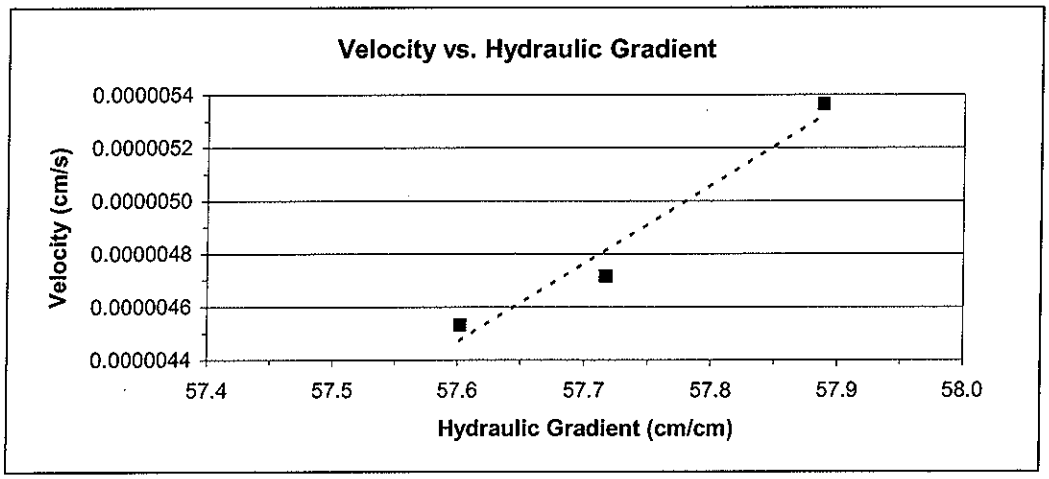
Type of water used: TAP
Backpressure (psi): 1.2
Offset (cm): 2.3
Sample length (cm): 3.06
Sample x-sectional area (cm^2): 9.51
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
20-Nov-08	08:41:50	19.5	95.3	177.4	7547	9.3E-08	9.3E-08
20-Nov-08	10:47:37	20.0	94.8	176.8			
Test # 2:							
20-Nov-08	10:47:37	20.0	94.8	176.8	7803	8.2E-08	8.2E-08
20-Nov-08	12:57:40	20.0	94.3	176.3			
Test # 3:							
20-Nov-08	12:57:40	20.0	94.3	176.3	3248	7.9E-08	7.9E-08
20-Nov-08	13:51:48	20.0	94.1	176.1			

***Average Ksat* (cm/sec):** **8.4E-08**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Falling Head Method

Job name: Brown and Caldwell
Job number: LB08.0201.00
Sample number: OU4-FEP-13A-SG
Project Name: OU4-Phase I
Project Number: 136259

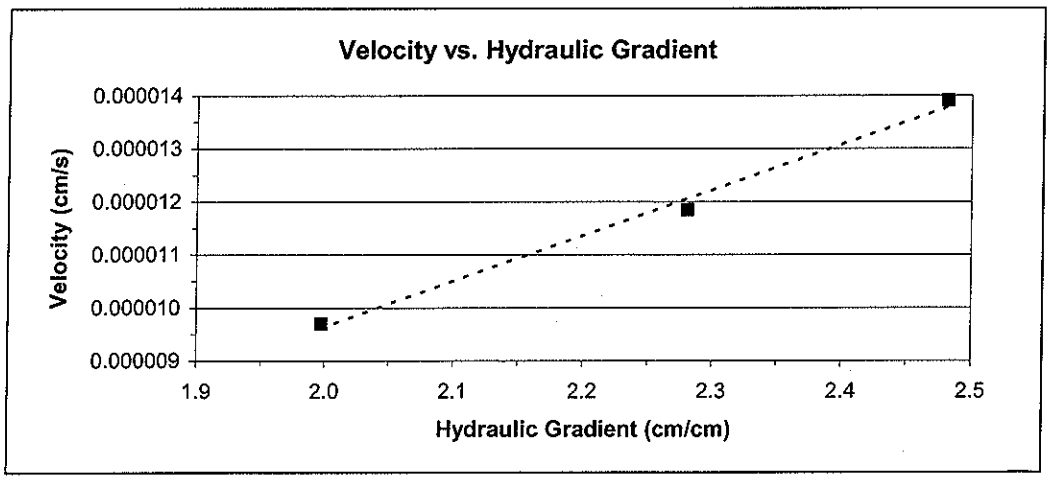
Type of water used: TAP
Backpressure (psi): 0.0
Offset (cm): 4.0
Sample length (cm): 3.62
Sample x-sectional area (cm^2): 14.23
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
17-Nov-08	10:21:45	19.5	13.2	9.2	1238	5.6E-06	5.7E-06
17-Nov-08	10:42:23	19.5	12.8	8.8			
Test # 2:							
17-Nov-08	10:42:23	19.5	12.8	8.8	4567	5.2E-06	5.2E-06
17-Nov-08	11:58:30	19.5	11.7	7.7			
Test # 3:							
17-Nov-08	11:58:30	19.5	11.7	7.7	4820	4.9E-06	4.9E-06
17-Nov-08	13:18:50	20.0	10.8	6.8			

***Average Ksat* (cm/sec):** **5.3E-06**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Falling Head Method

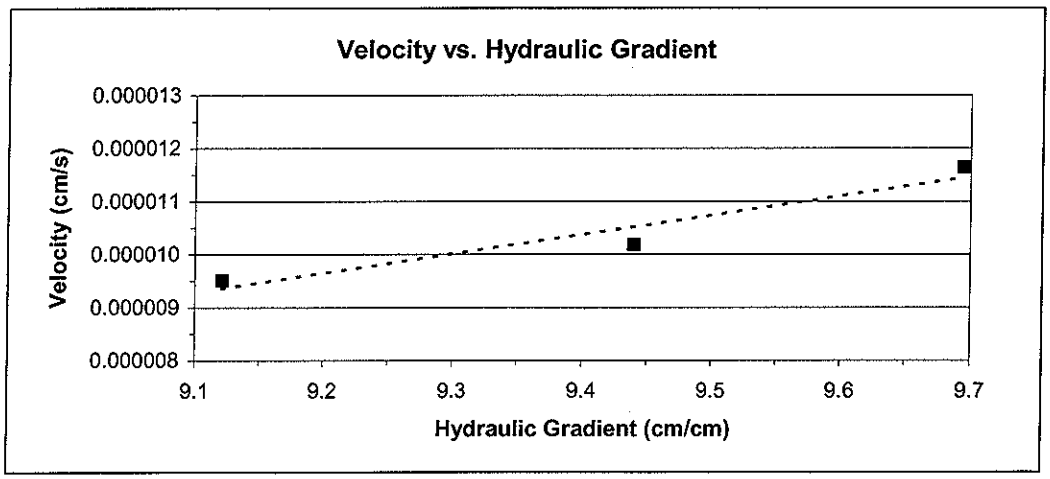
Job name: Brown and Caldwell
Job number: LB08.0201.00
Sample number: OU4-FEP-13B-SG
Project Name: OU4-Phase I
Project Number: 136259

Type of water used: TAP
Backpressure (psi): 0.0
Offset (cm): 1.3
Sample length (cm): 3.14
Sample x-sectional area (cm^2): 14.37
Reservoir x-sectional area (cm^2): 0.70

Date	Time	Temp (°C)	Reservoir head (cm)	Corrected head (cm)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:							
18-Nov-08	08:54:23	19.5	31.9	30.6	2302	1.2E-06	1.2E-06
18-Nov-08	09:32:45	19.5	31.3	30.0			
Test # 2:							
18-Nov-08	09:32:45	19.5	31.3	30.0	5025	1.1E-06	1.1E-06
18-Nov-08	10:56:30	20.0	30.3	29.0			
Test # 3:							
18-Nov-08	10:56:30	20.0	30.3	29.0	4868	1.0E-06	1.0E-06
18-Nov-08	12:17:38	20.0	29.3	28.0			

***Average Ksat* (cm/sec):** **1.1E-06**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:
--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Saturated Hydraulic Conductivity
Constant Head Method

Job name:	Brown and Caldwell	*Type of water used:*	TAP
Job number:	LB08.0201.00	*Collection vessel tare* (g):	9.16
Sample number:	OU4-FEP-15A-SG	*Sample length* (cm):	4.47
Project Name:	OU4-Phase I	*Sample diameter* (cm):	4.84
Project Number:	136259	*Sample x-sectional area* (cm^2):	18.37

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
19-Nov-08	12:09:13	20.0	2.3	9.8	0.6	902	7.3E-05	7.3E-05
19-Nov-08	12:24:15							
Test # 2:								
19-Nov-08	13:07:36	20.0	2.2	10.5	1.4	2178	7.0E-05	7.0E-05
19-Nov-08	13:43:54							
Test # 3:								
19-Nov-08	14:37:07	20.0	2.1	9.7	0.6	961	6.9E-05	6.9E-05
19-Nov-08	14:53:08							

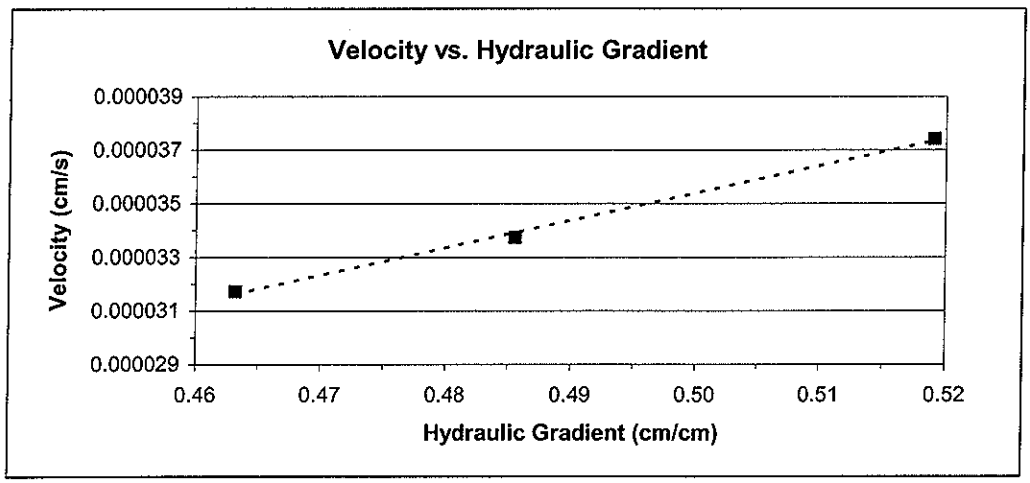
***Average Ksat* (cm/sec):** **7.1E-05**

***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed



Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines

Saturated Hydraulic Conductivity
Constant Head Method

Job name: Brown and Caldwell
Job number: LB08.0201.00
Sample number: OU4-FEP-15B-SG
Project Name: OU4-Phase I
Project Number: 136259

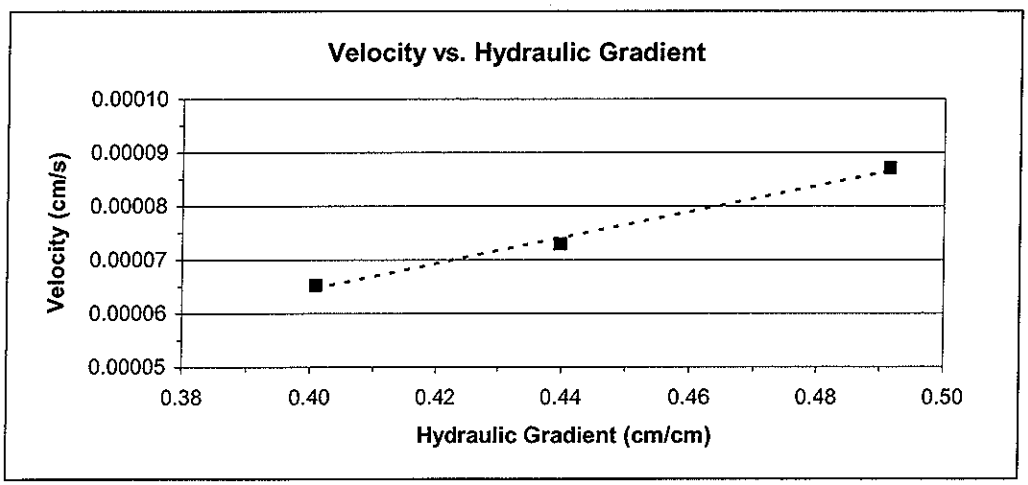
Type of water used: TAP
Collection vessel tare (g): 9.18
Sample length (cm): 3.87
Sample diameter (cm): 4.82
Sample x-sectional area (cm^2): 18.22

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm^3)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
17-Nov-08	13:15:12	20.0	1.6	10.4	1.2	1101	1.5E-04	1.5E-04
17-Nov-08	13:33:33							
Test # 2:								
17-Nov-08	14:43:23	20.0	1.7	10.1	1.0	775	1.5E-04	1.5E-04
17-Nov-08	14:56:18							
Test # 3:								
17-Nov-08	15:42:10	20.0	1.9	11.0	1.8	1216	1.7E-04	1.7E-04
17-Nov-08	16:02:26							

***Average Ksat* (cm/sec):** **1.6E-04**
***Oversize Corrected Ksat* (cm/sec):** **NA**

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
NA = Not analyzed



Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Moisture Retention Characteristics

Summary of Moisture Characteristics of the Initial Drainage Curve

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-LEP-10A-SG	0	43.9 ⌗
	52	43.4 ⌗
	142	43.2 ⌗
	337	40.5 ⌗
	1530	40.1 ⌗
	263108	10.7 ⌗
	851293	9.9 ⌗
OU4-LEP-10B-SG	0	41.2 ⌗
	57	41.5 ⌗
	129	39.5
	337	39.2
	1530	38.3
	40792	14.7
	103000	9.1
	851293	6.2
OU4-FEP-13A-SG	0	31.6
	55	27.7
	98	25.7
	206	23.1
	449	20.9
	36611	10.1
	145831	8.3
	851293	5.2
OU4-FEP-13B-SG	0	33.9
	48	33.2
	118	32.0
	217	30.8
	449	29.1
	26311	10.3
	400781	5.9
	851293	5.3

⌗ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Moisture Characteristics of the Initial Drainage Curve (Continued)

Sample Number	Pressure Head (-cm water)	Moisture Content (%, cm^3/cm^3)
OU4-FEP-15A-SG	0	30.7
	16	30.3
	59	27.7
	126	26.6
	449	25.4
	169287	10.3
	851293	5.1
OU4-FEP-15B-SG	0	42.1
	7	39.6
	38	29.9
	100	26.6
	449	23.4
	42322	10.2
	235574	6.7
	851293	4.7

‡‡ Volume adjustments are applicable at this matric potential (see data sheet for this sample).

Summary of Calculated Unsaturated Hydraulic Properties

Sample Number	α (cm^{-1})	N (dimensionless)	θ_r (% vol)	θ_s (% vol)	Oversize Corrected θ_r (% vol)	Oversize Corrected θ_s (% vol)
OU4-LEP-10A-SG	0.0004	1.2775	0.00	43.12	NA	NA
OU4-LEP-10B-SG	0.0003	1.4006	0.00	40.67	NA	NA
OU4-FEP-13A-SG	0.0267	1.1680	0.00	31.63	NA	NA
OU4-FEP-13B-SG	0.0021	1.3563	3.15	33.50	NA	NA
OU4-FEP-15A-SG	0.0053	1.1771	0.00	29.88	NA	NA
OU4-FEP-15B-SG	0.1328	1.1702	0.00	42.45	NA	NA

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NA = Not analyzed

Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10A-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 46.46
Tare wt., ring (g): 31.20
Tare wt., screen & clamp (g): 52.64
Initial sample volume (cm^3): 27.60
Initial dry bulk density (g/cm^3): 1.68
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 36.49

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)	
Hanging column:	20-Nov-08	14:05	143.32	0.00	43.94	‡‡
	26-Nov-08	10:26	143.15	51.50	43.36	‡‡
	2-Dec-08	12:00	142.90	142.00	43.17	‡‡
Pressure plate:	15-Dec-08	12:45	142.04	336.53	40.49	‡‡
	29-Dec-08	10:37	141.92	1529.70	40.08	‡‡

Volume Adjusted Data[1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	29.63	+7.35%	1.57	40.84
	51.50	29.63	+7.35%	1.57	40.84
	142.00	29.19	+5.73%	1.59	39.93
Pressure plate:	336.53	28.99	+5.03%	1.60	39.53
	1529.70	28.99	+5.03%	1.60	39.53

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: D. O'Dowd/ R. Marshall
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-LEP-10A-SG

Dry weight of dew point potentiometer sample* (g): 5.33
Tare weight, jar (g): 3.52
Initial sample bulk density (g/cm^3): 1.68

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)	
Dew point potentiometer:	6-Jan-09	11:07	5.45	263108.4	10.69	‡‡

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	263108.4	28.99	+5.03%	1.60	39.53

Dry weight of relative humidity box sample* (g): 61.08
Tare weight (g): 41.72
Initial sample bulk density (g/cm^3): 1.68

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)	
Relative humidity box:	26-Nov-08	10:30	62.27	851293	9.89	‡‡

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	28.99	+5.03%	1.60	39.53

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

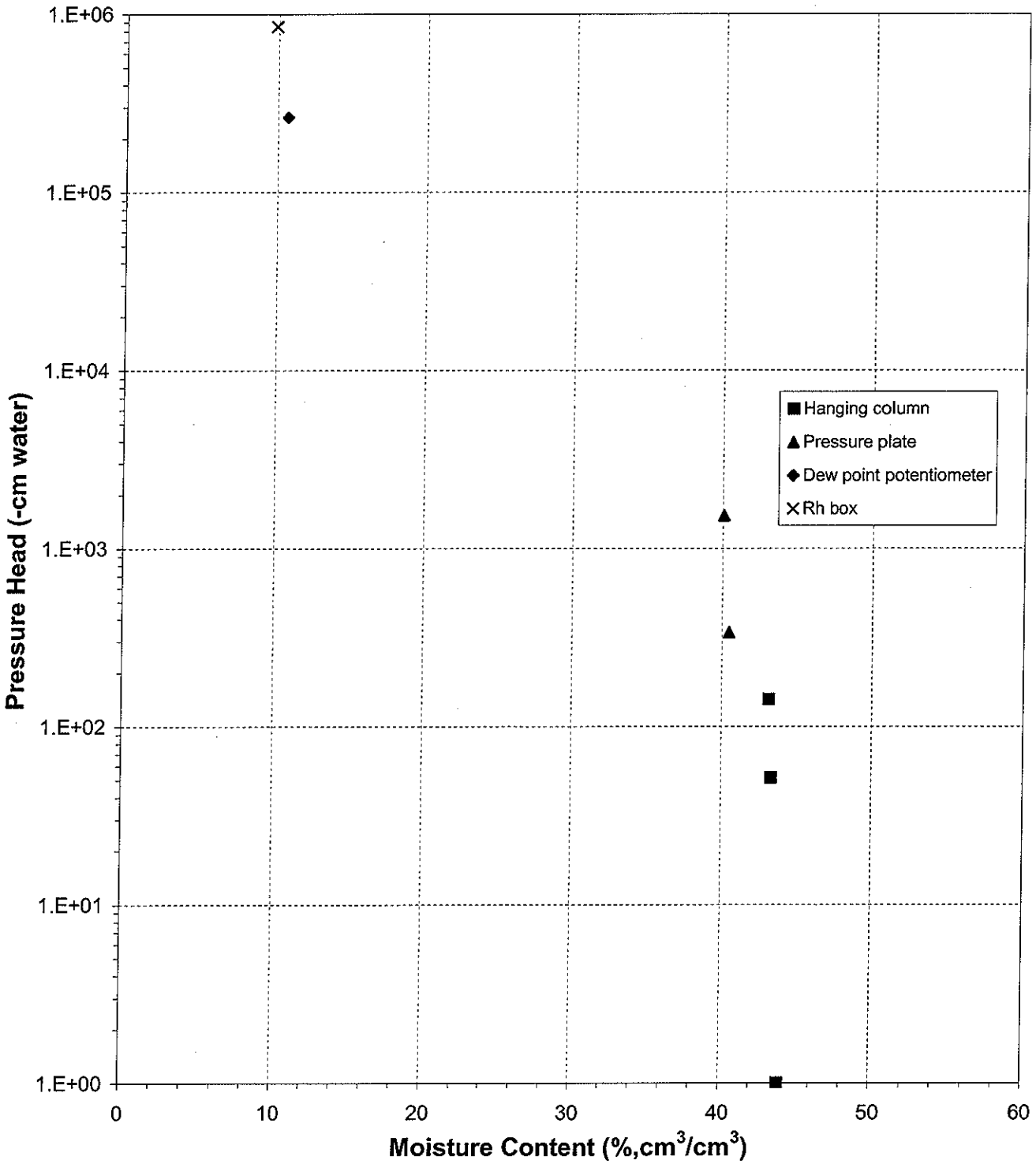
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

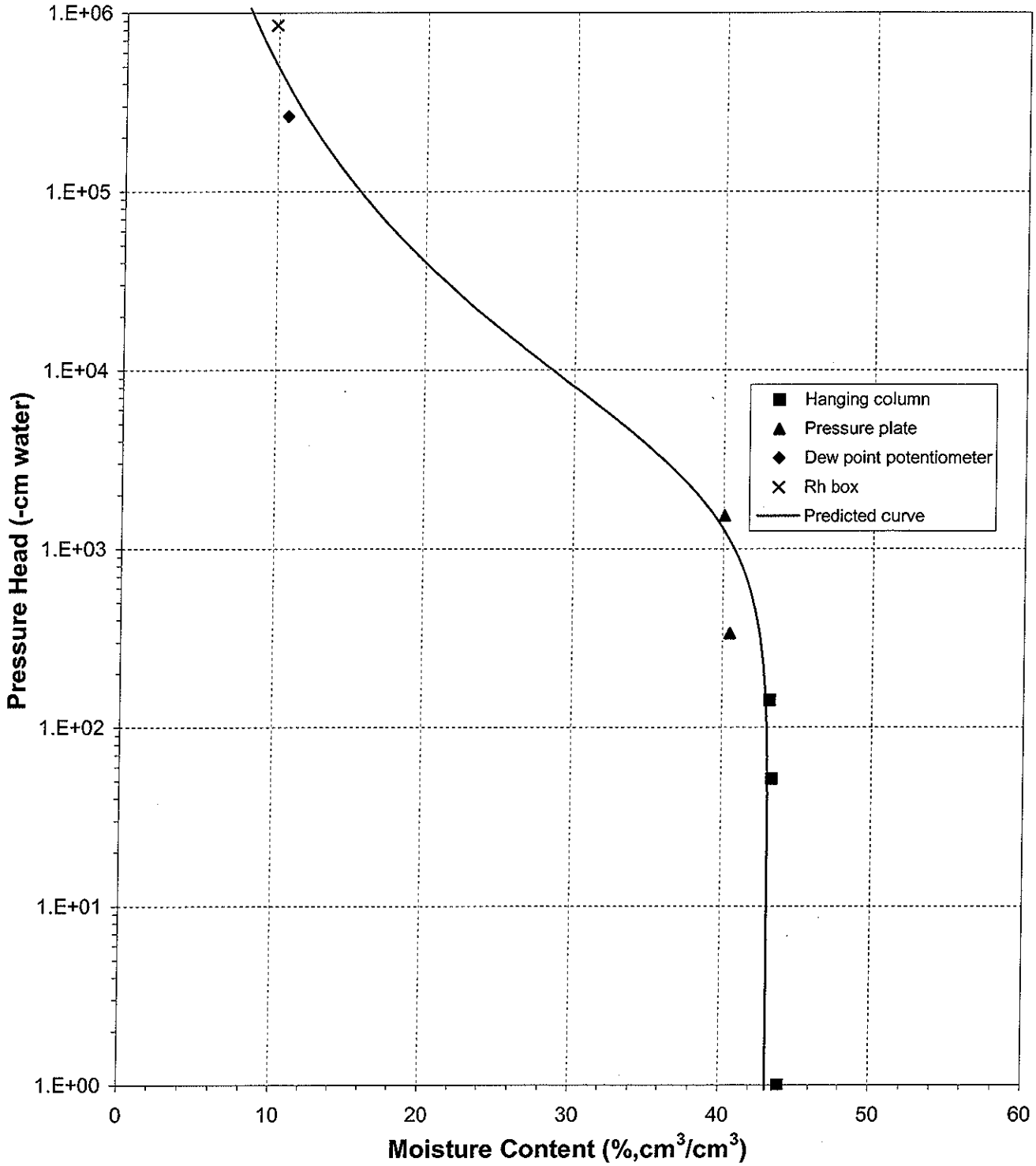
Water Retention Data Points

Sample Number: OU4-LEP-10A-SG



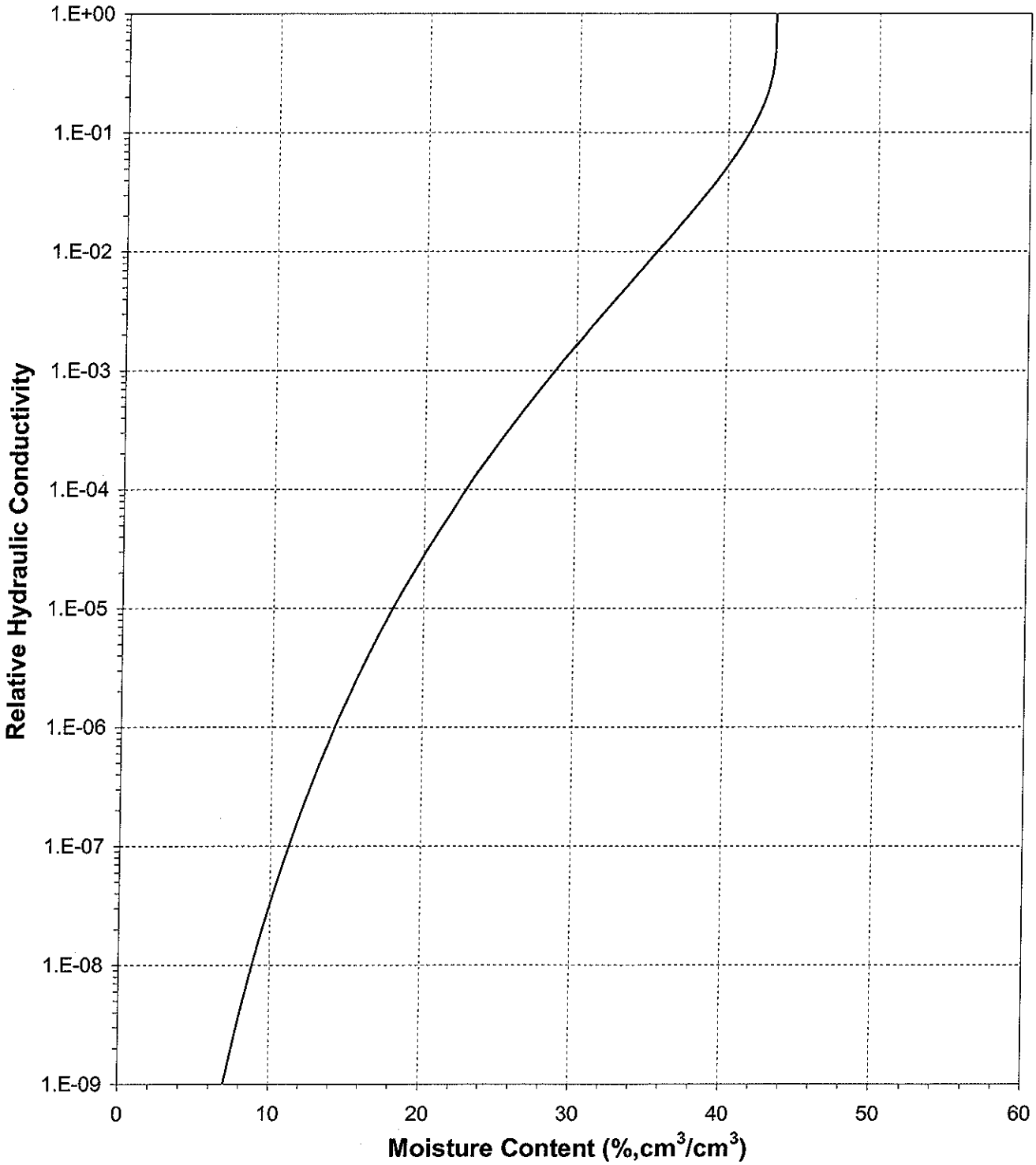
Predicted Water Retention Curve and Data Points

Sample Number: OU4-LEP-10A-SG



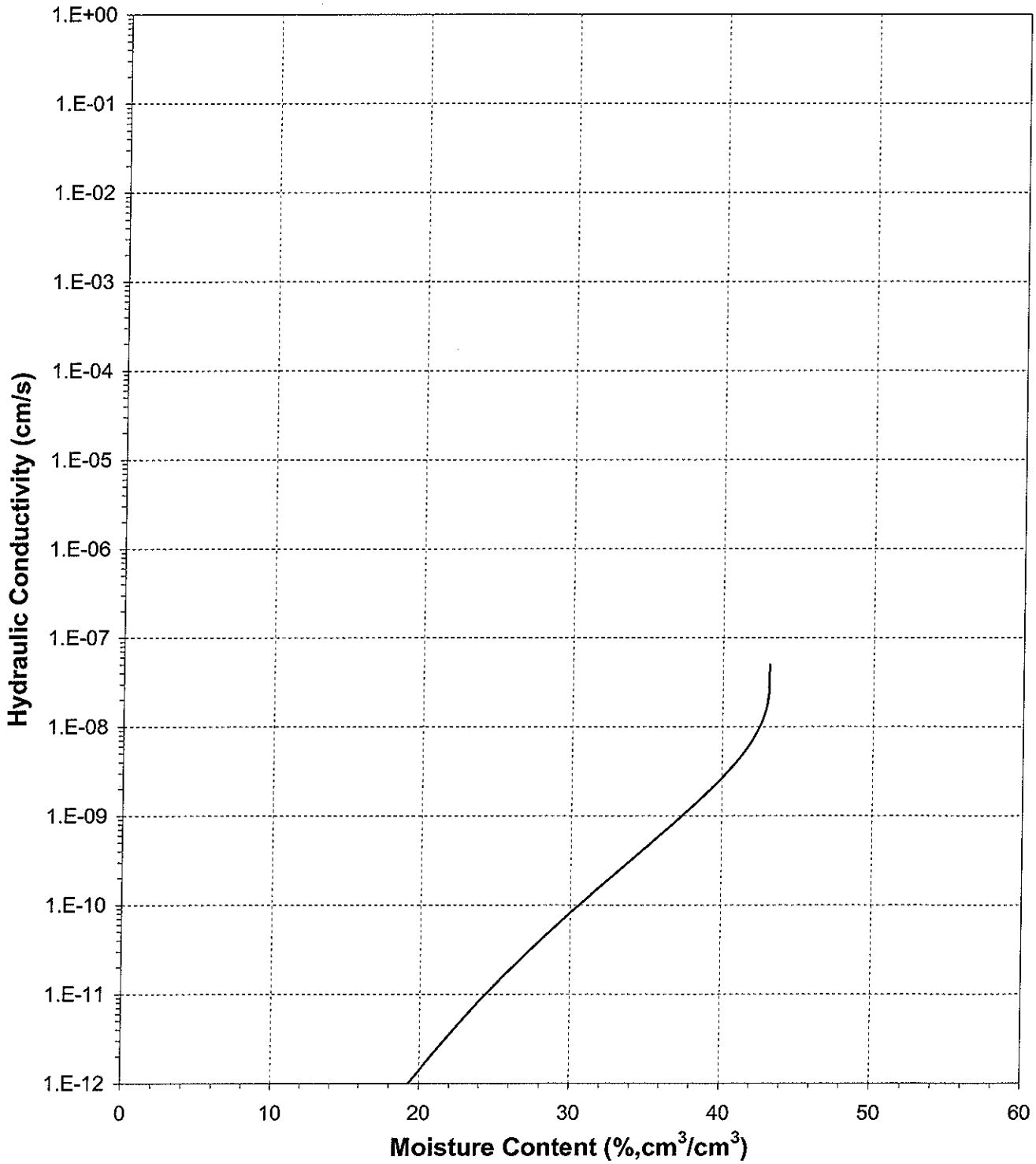
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-10A-SG



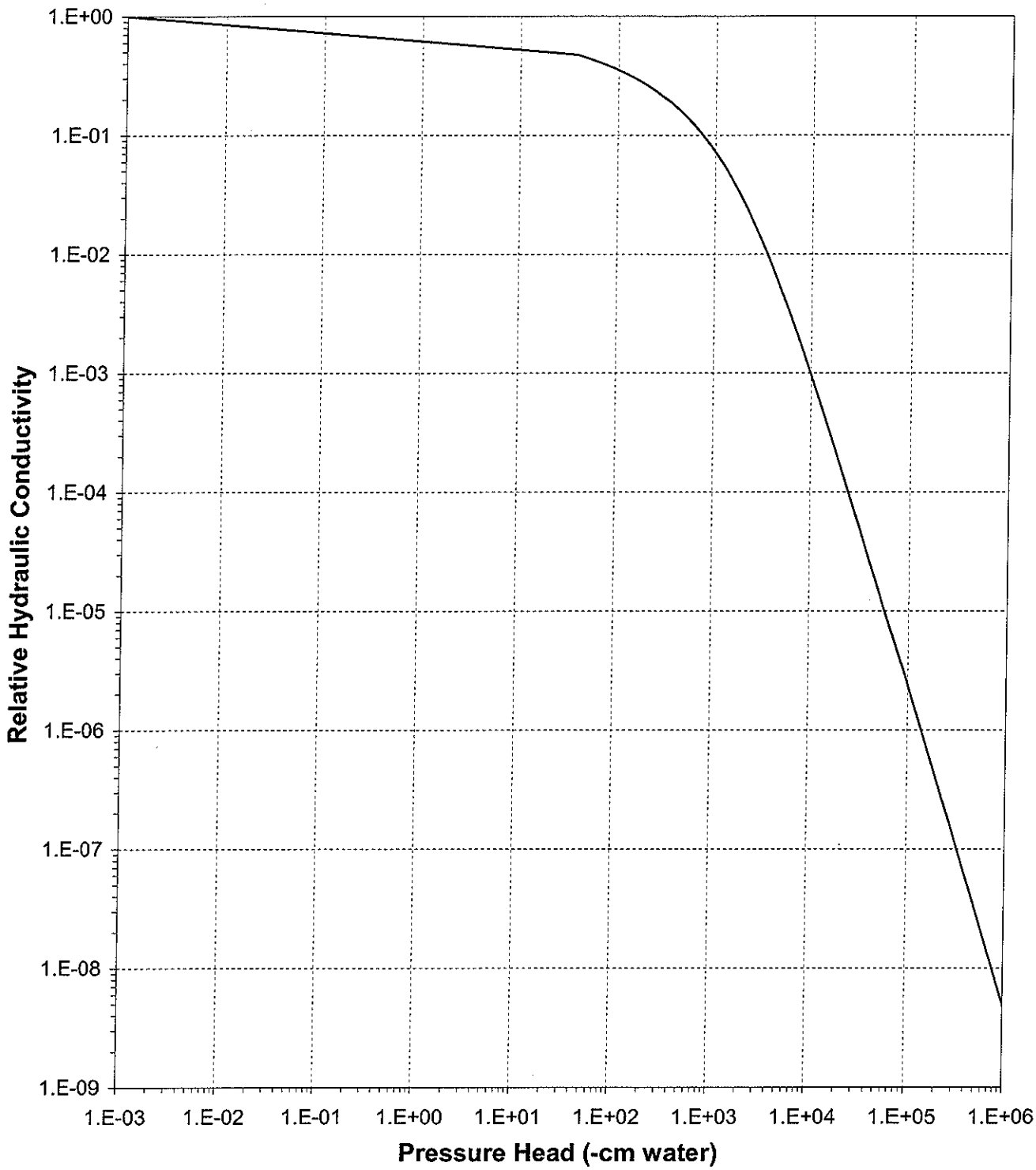
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-10A-SG



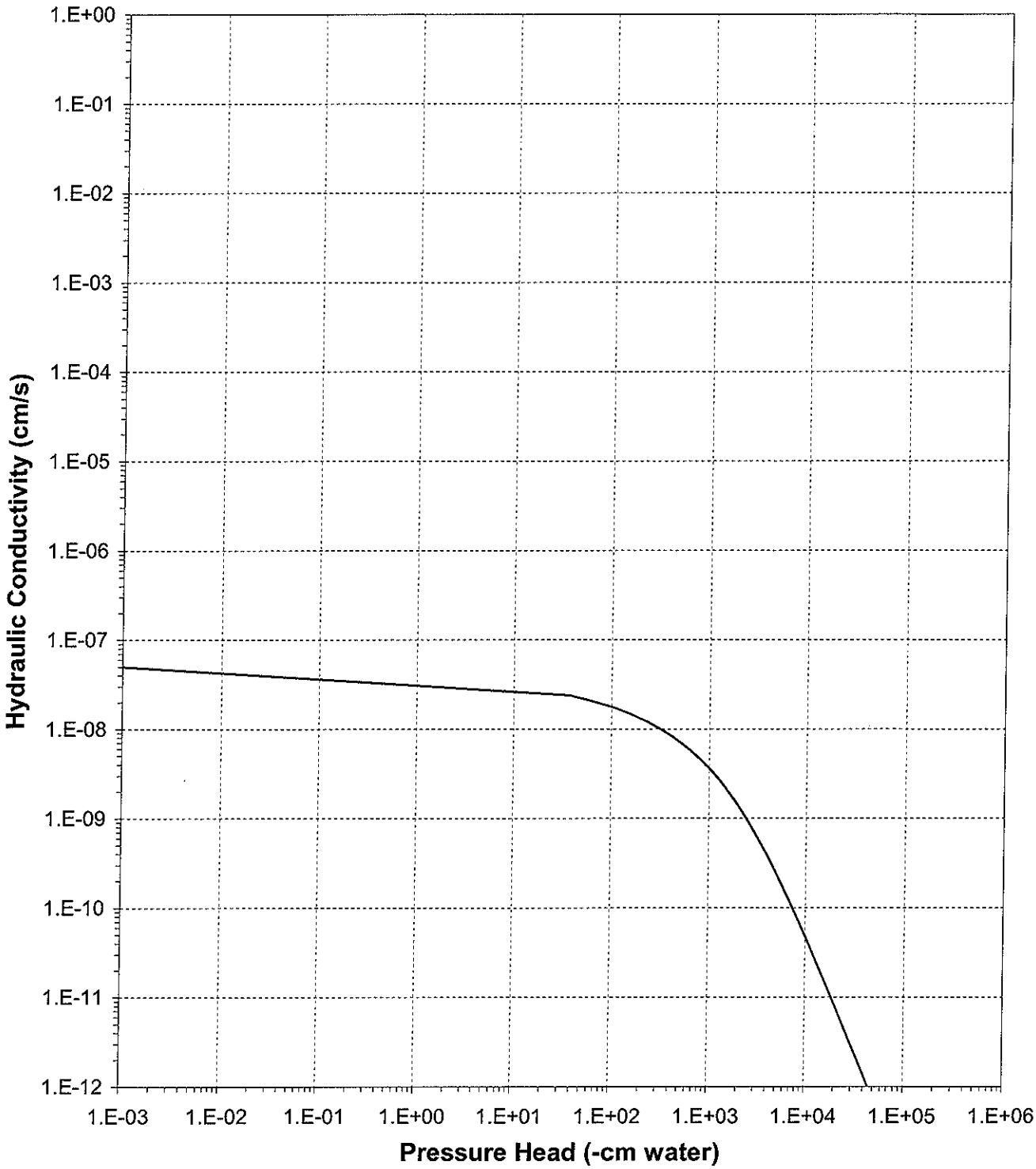
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-10A-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-10A-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10B-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 50.32
Tare wt., ring (g): 35.22
Tare wt., screen & clamp (g): 57.36
Initial sample volume (cm^3): 29.12
Initial dry bulk density (g/cm^3): 1.73
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 34.80

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content † (% vol)	
Hanging column:	20-Nov-08	14:10	155.50	0.00	41.23	##
	26-Nov-08	10:12	155.58	57.00	41.50	##
	2-Dec-08	12:05	154.40	129.00	39.49	
Pressure plate:	15-Dec-08	12:45	154.31	336.53	39.18	
	29-Dec-08	10:35	154.06	1529.70	38.32	

Volume Adjusted Data [1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	30.56	+4.93%	1.65	37.87
	57.00	30.56	+4.93%	1.65	37.87
	129.00	---	---	---	---
Pressure plate:	336.53	---	---	---	---
	1529.70	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: D. O'Dowd/ R. Marshall
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-LEP-10B-SG

Dry weight of dew point potentiometer sample* (g): 139.22
Tare weight, jar (g): 117.84
Initial sample bulk density (g/cm^3): 1.73

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)
Dew point potentiometer:	17-Nov-08	13:11	141.04	40792.0	14.71
	18-Nov-08	11:02	140.35	102999.8	9.12

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	40792.0	---	---	---	---
	102999.8	---	---	---	---

Dry weight of relative humidity box sample* (g): 68.62
Tare weight (g): 38.33
Initial sample bulk density (g/cm^3): 1.73

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)
Relative humidity box:	26-Nov-08	10:30	69.71	851293	6.19

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

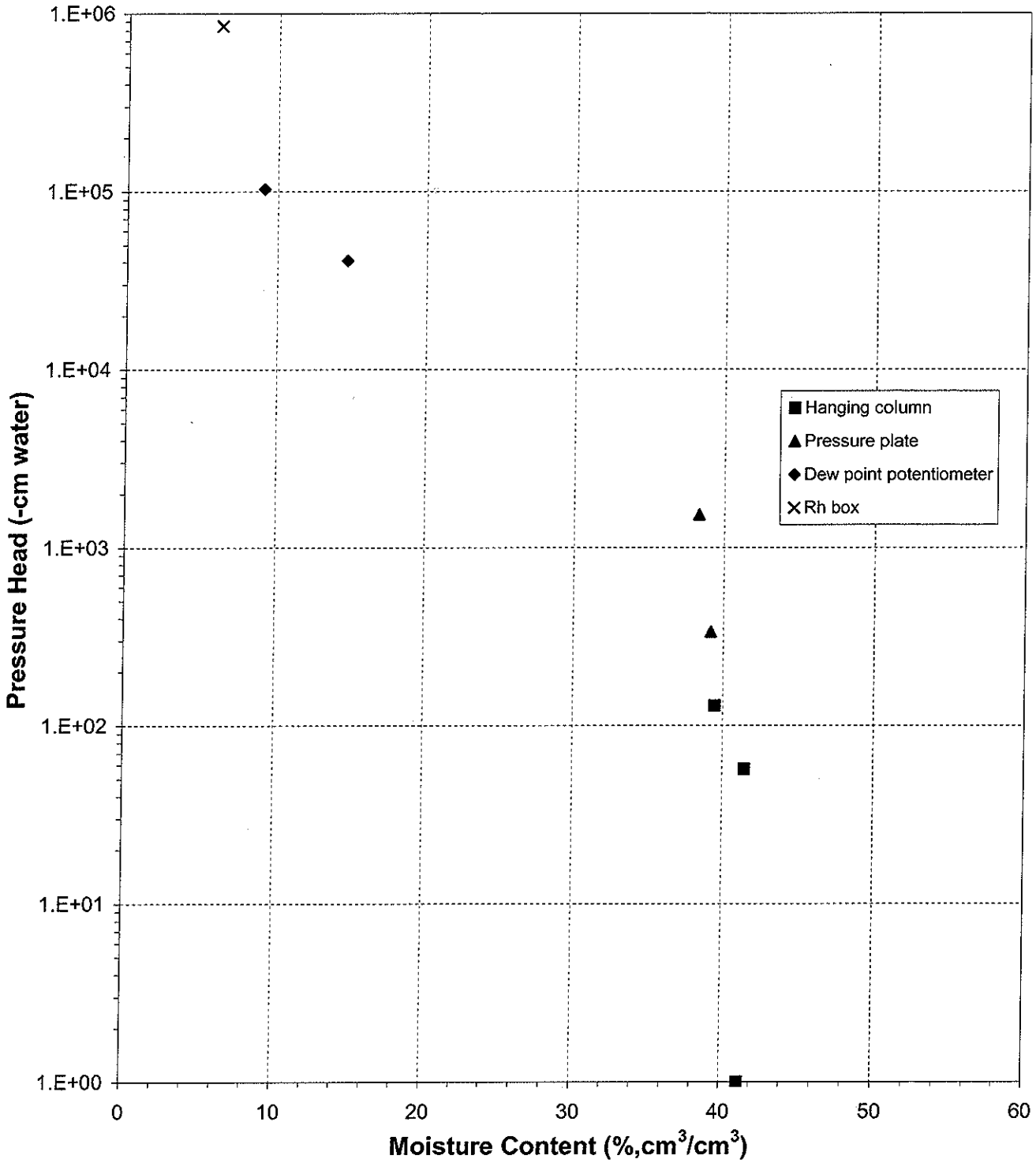
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

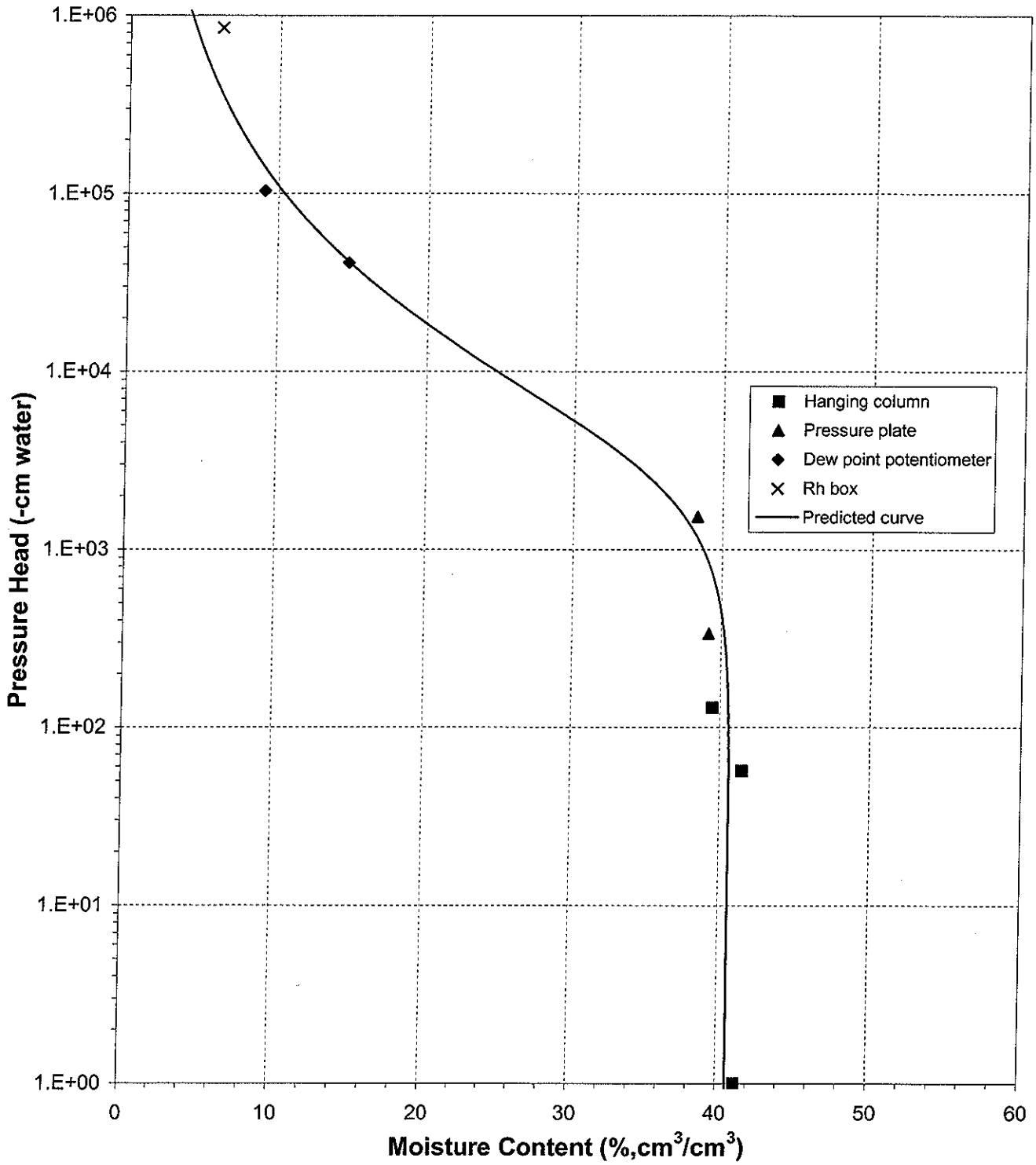
Water Retention Data Points

Sample Number: OU4-LEP-10B-SG



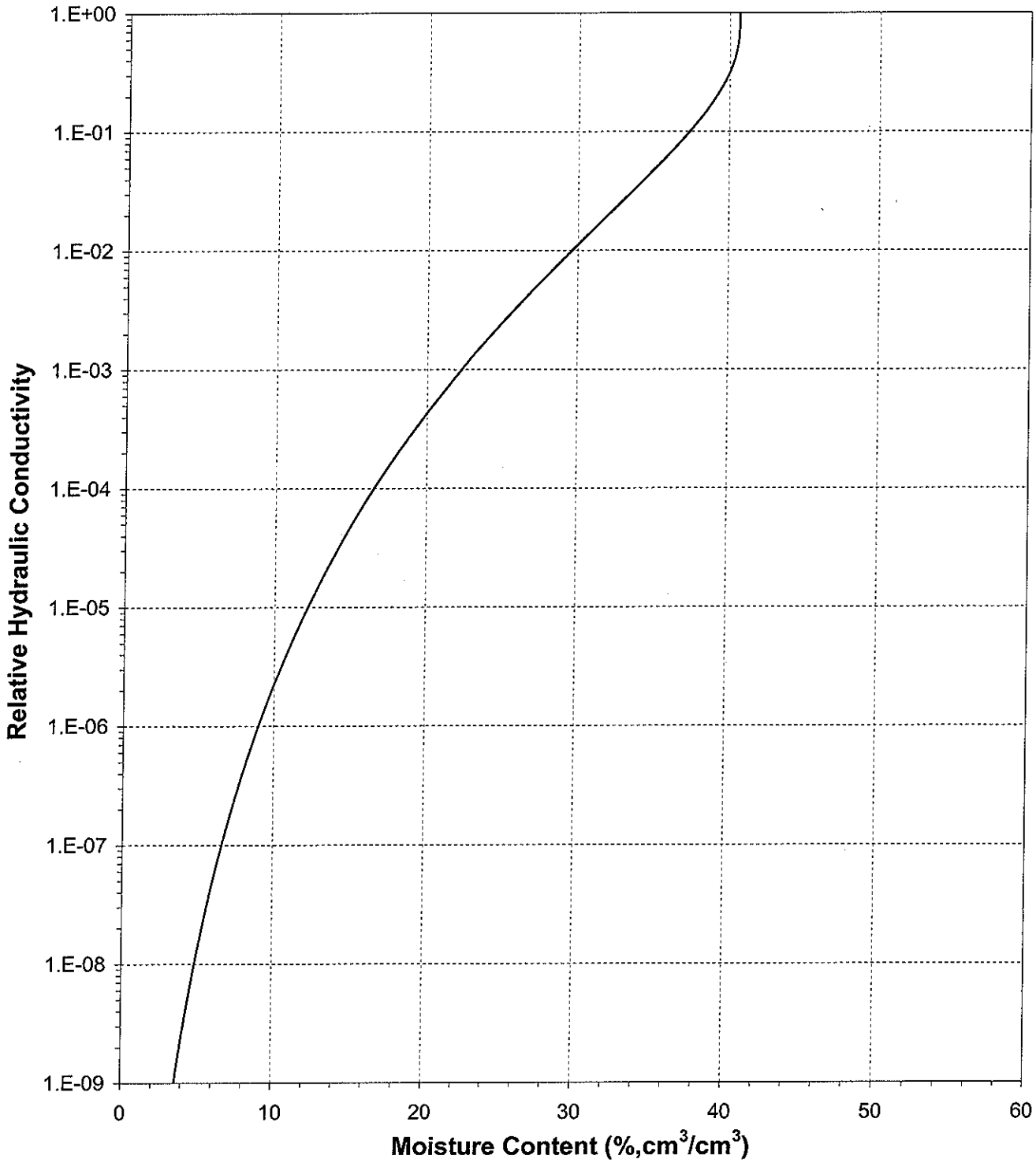
Predicted Water Retention Curve and Data Points

Sample Number: OU4-LEP-10B-SG



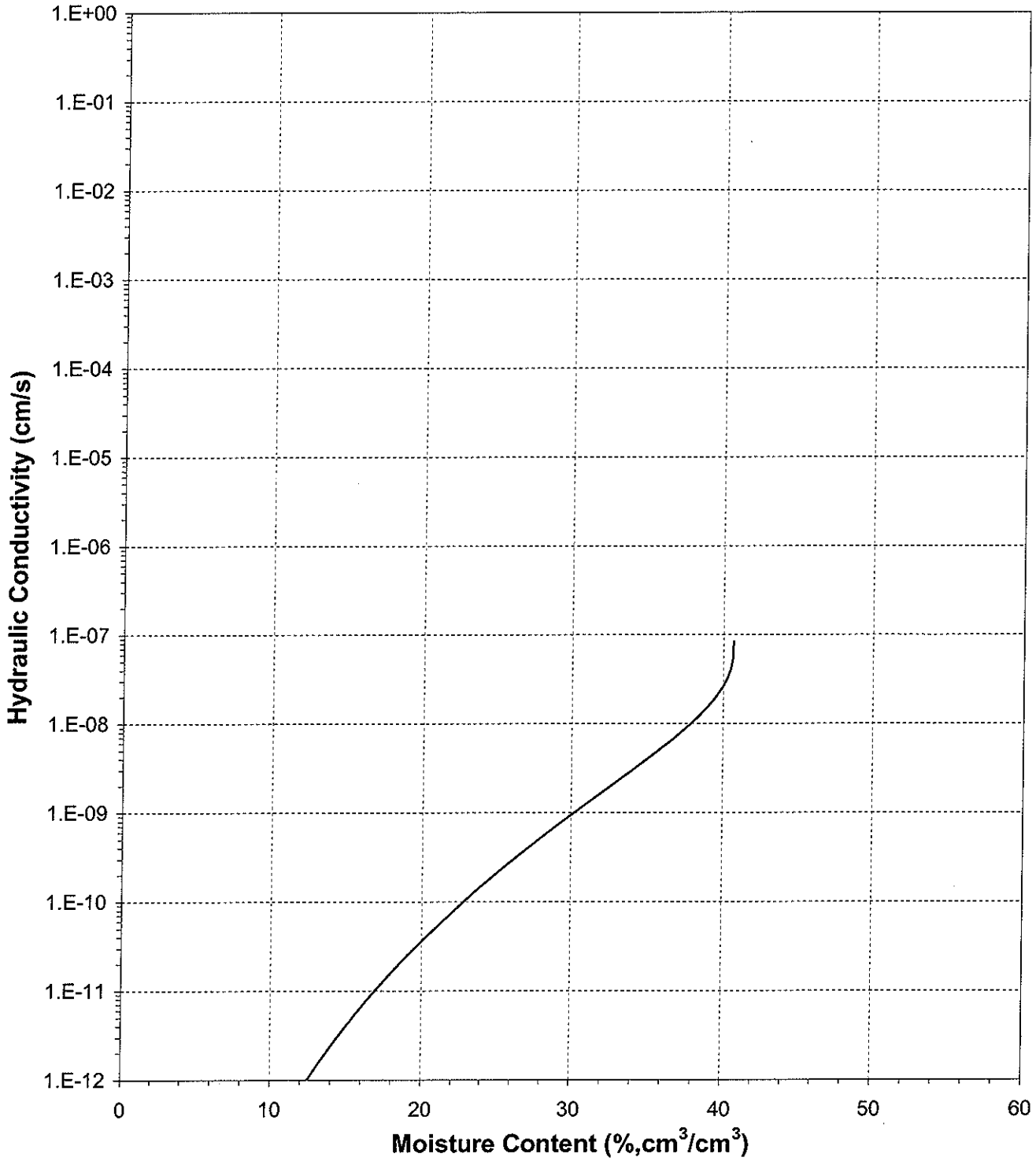
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-10B-SG



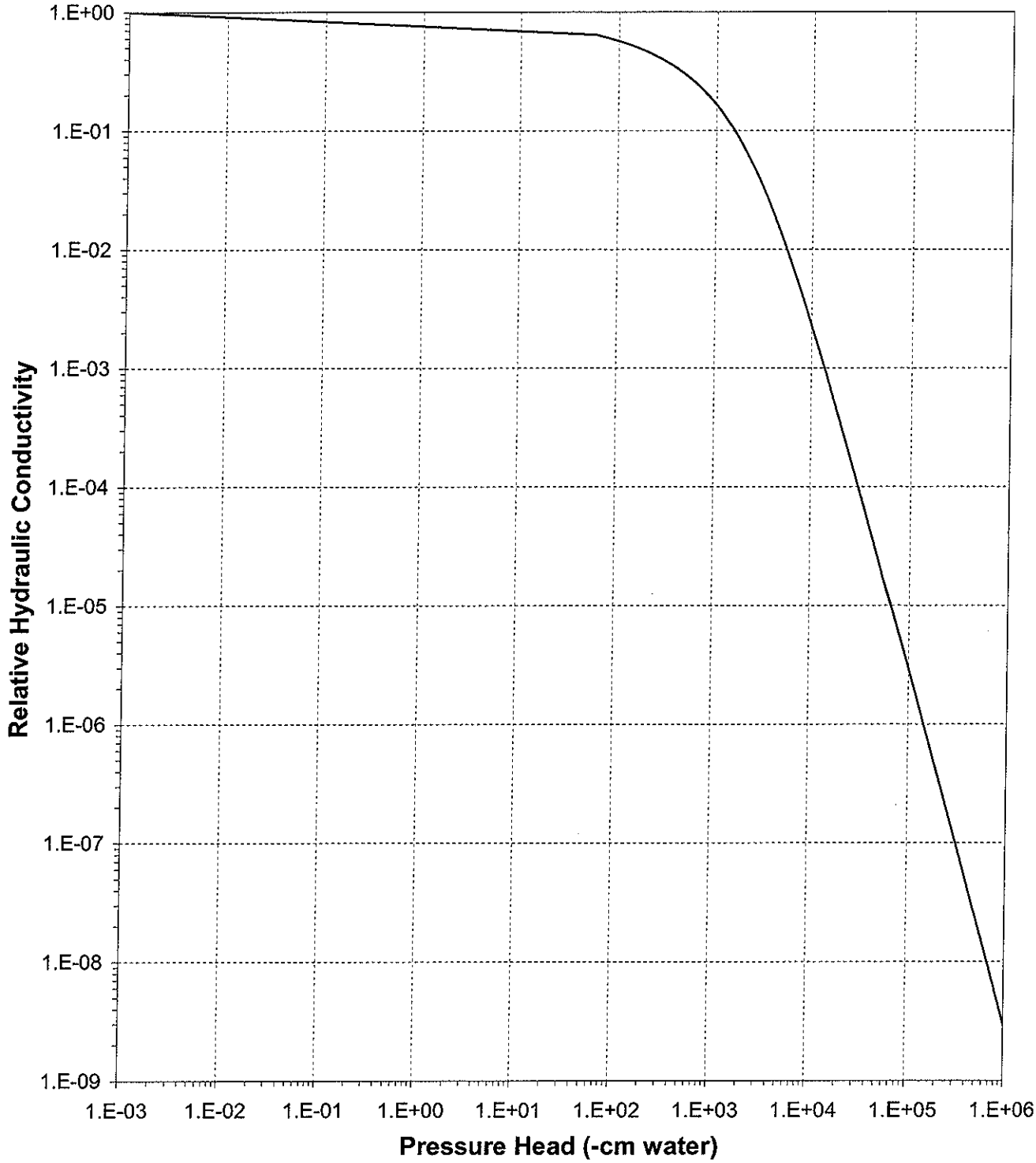
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-LEP-10B-SG



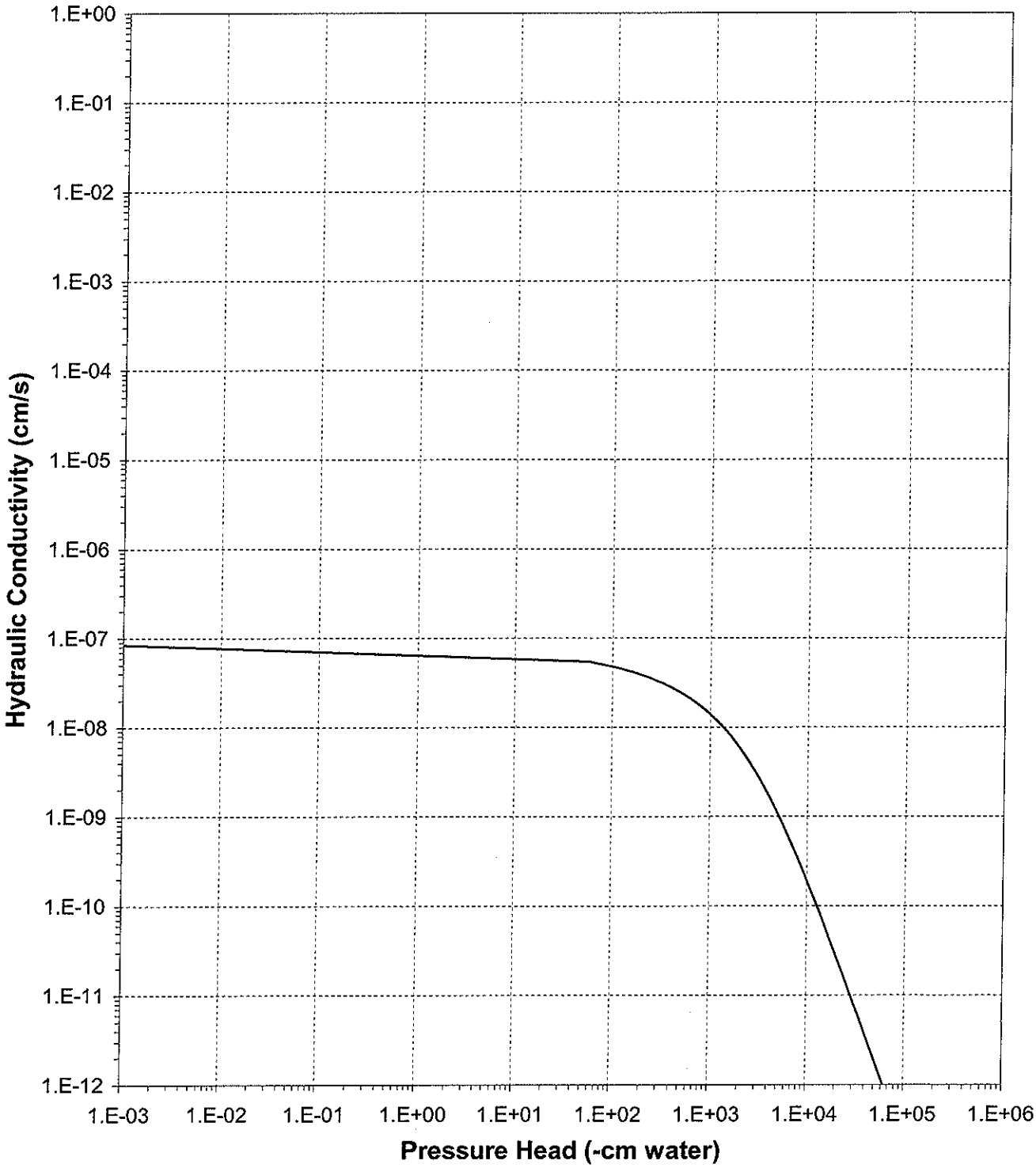
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-10B-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-LEP-10B-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13A-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 90.23
Tare wt., ring (g): 7.56
Tare wt., screen & clamp (g): 24.51
Initial sample volume (cm^3): 51.46
Initial dry bulk density (g/cm^3): 1.75
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 33.83

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content † (% vol)
Hanging column:	18-Nov-08	13:00	138.58	0.00	31.64
	24-Nov-08	10:40	136.56	54.50	27.71
	1-Dec-08	9:00	135.52	97.50	25.69
	8-Dec-08	9:25	134.19	206.00	23.11
Pressure plate:	17-Dec-08	9:40	133.07	448.71	20.93

Volume Adjusted Data [1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	54.50	---	---	---	---
	97.50	---	---	---	---
	206.00	---	---	---	---
Pressure plate:	448.71	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: D. O'Dowd/ K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-FEP-13A-SG

Dry weight of dew point potentiometer sample* (g): 147.72
Tare weight, jar (g): 112.93
Initial sample bulk density (g/cm^3): 1.75

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content † (% vol)
Dew point potentiometer:	20-Nov-08	10:55	149.73	36610.8	10.13
	18-Nov-08	10:14	149.37	145831.4	8.28

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	36610.8	---	---	---	---
	145831.4	---	---	---	---

Dry weight of relative humidity box sample* (g): 68.38
Tare weight (g): 41.04
Initial sample bulk density (g/cm^3): 1.75

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content † (% vol)
Relative humidity box:	26-Nov-08	10:30	69.19	851293	5.20

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

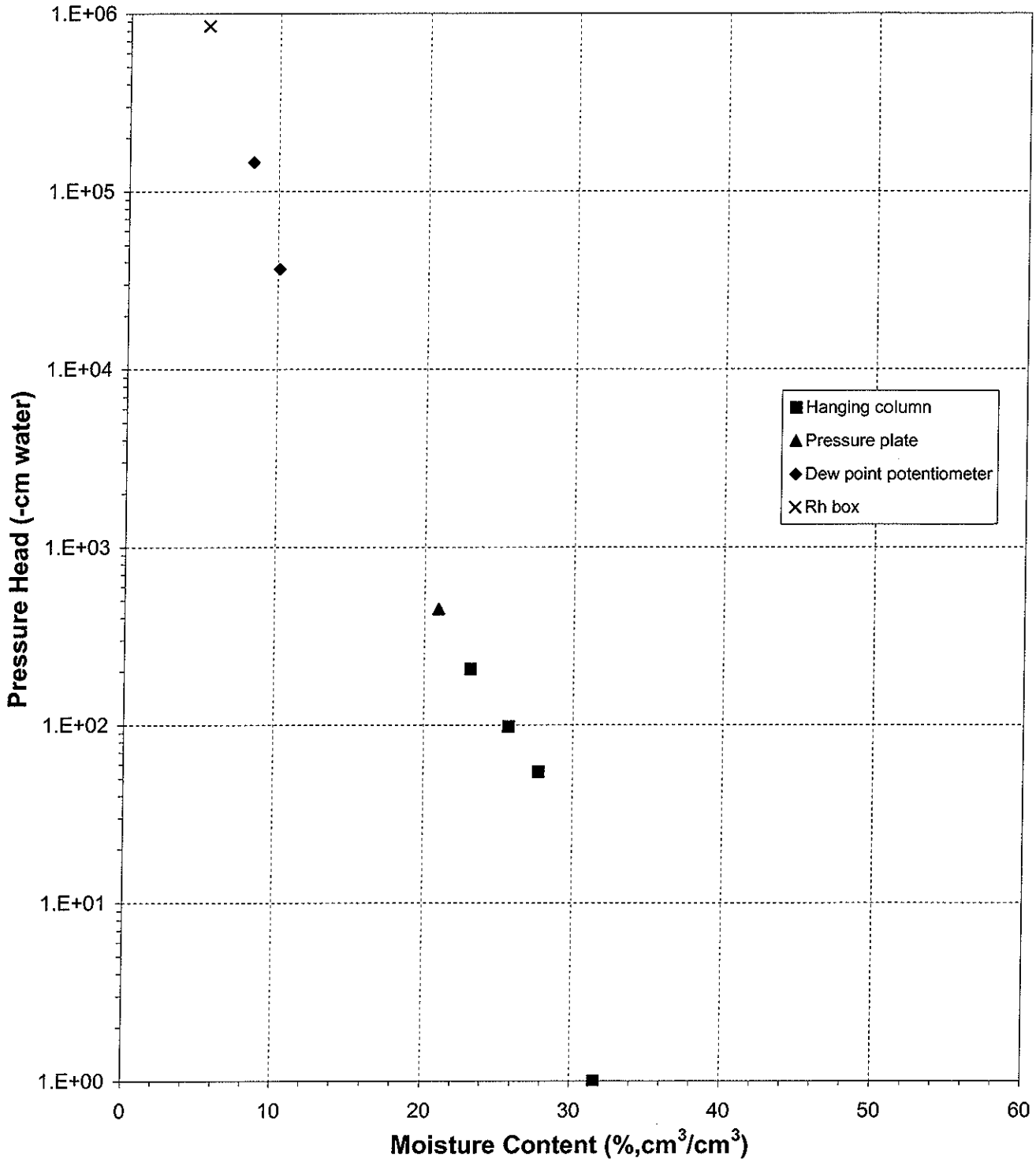
† Assumed density of water is 1.0 g/cm^3

Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

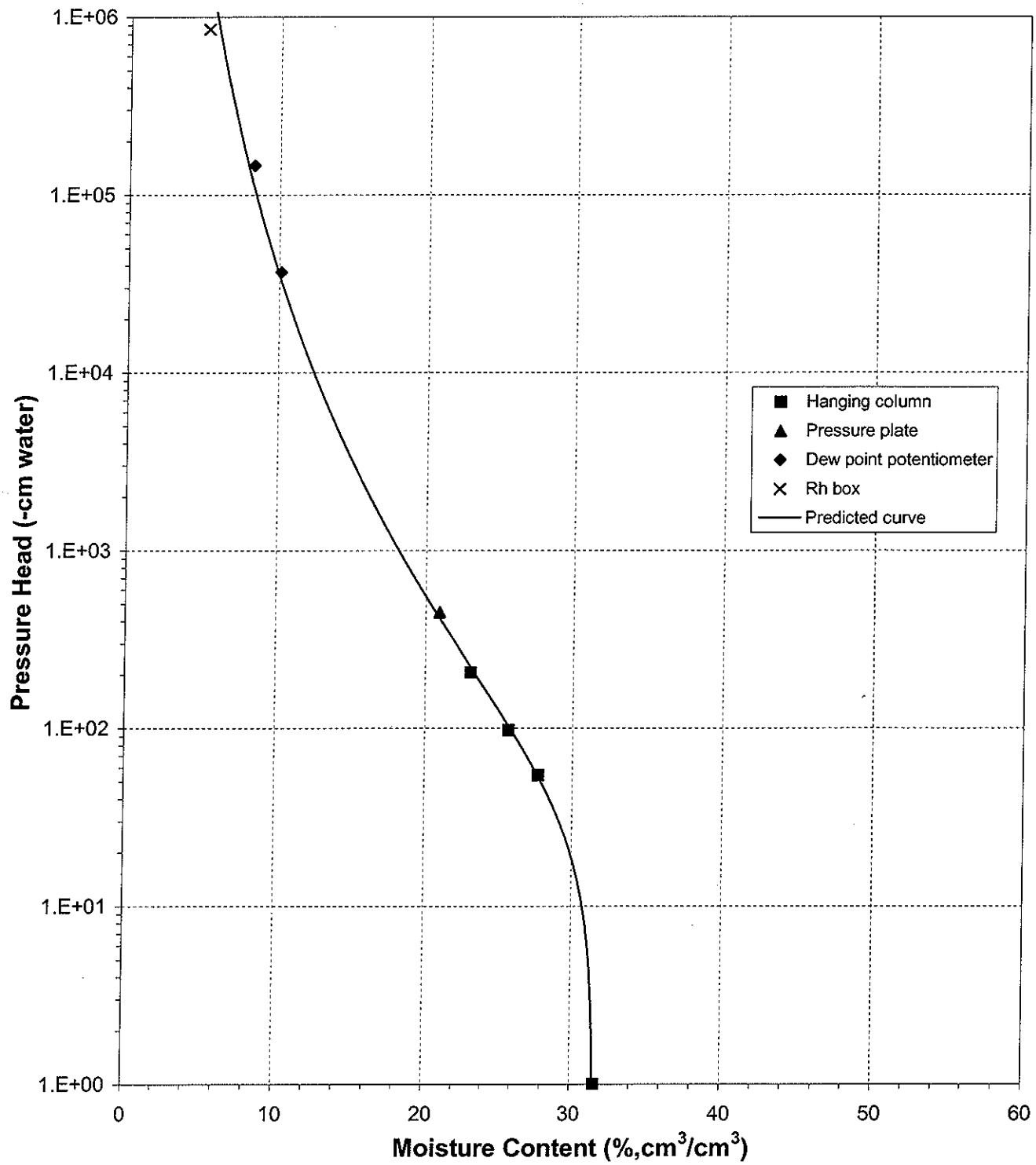
Water Retention Data Points

Sample Number: OU4-FEP-13A-SG



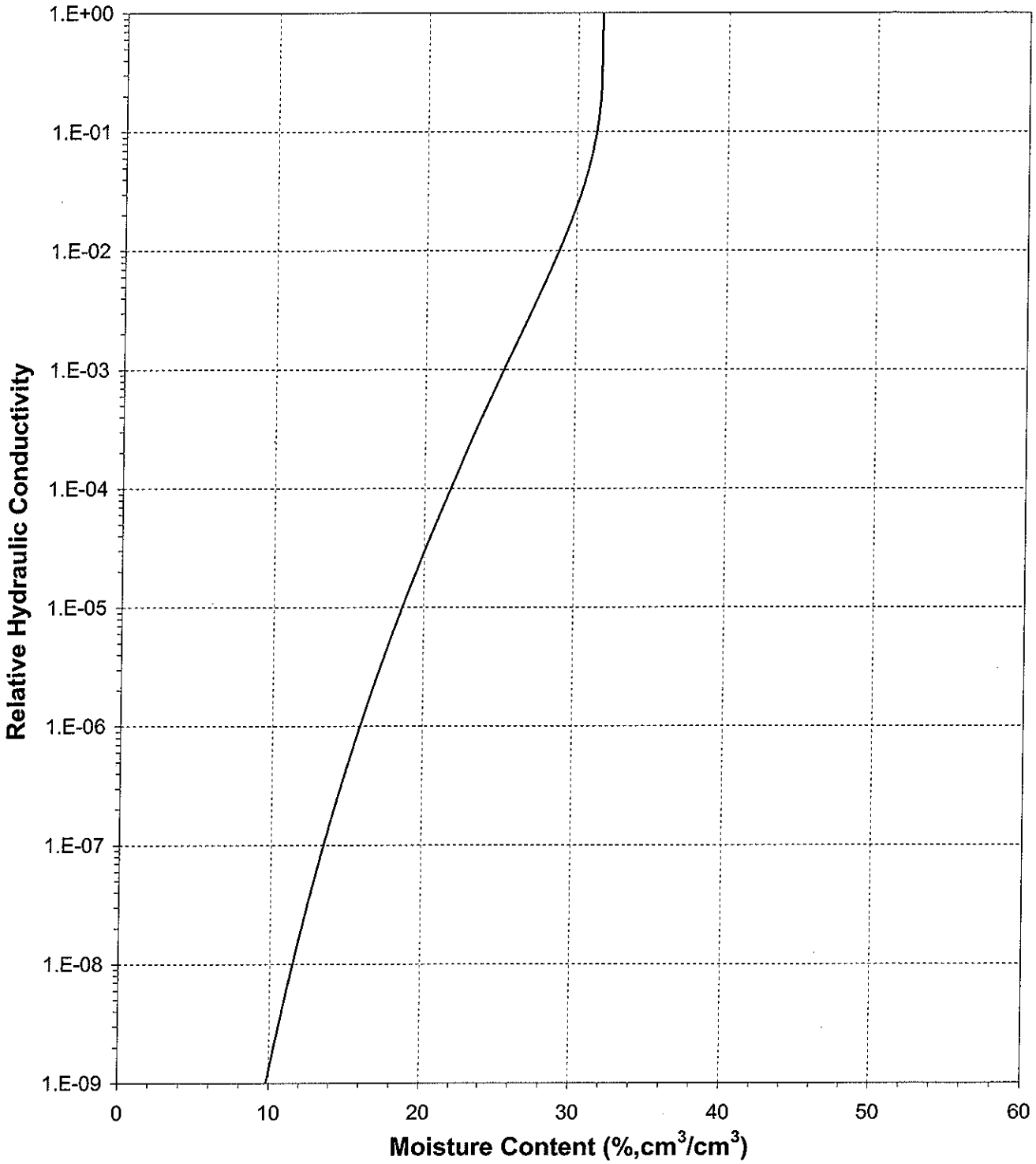
Predicted Water Retention Curve and Data Points

Sample Number: OU4-FEP-13A-SG



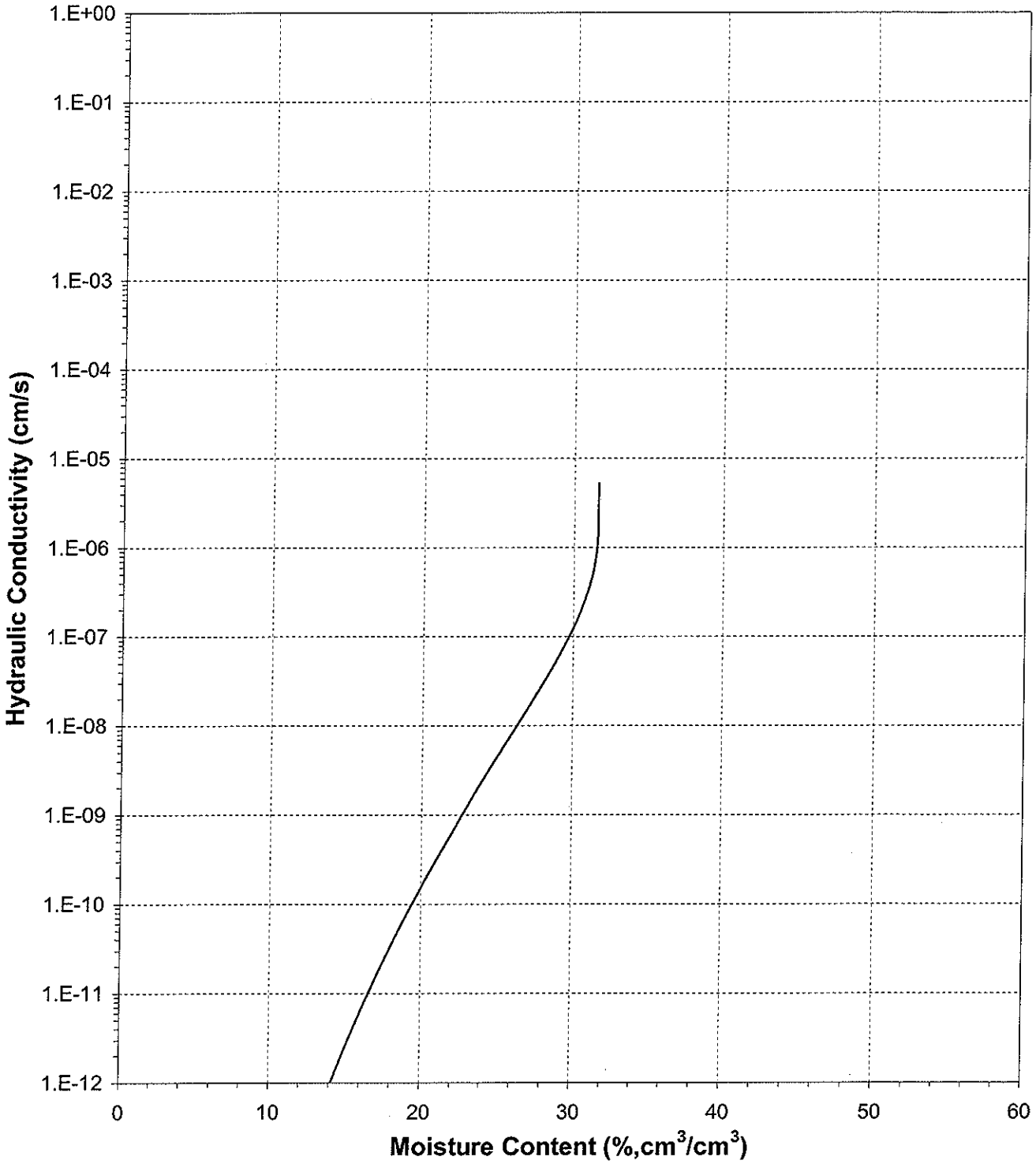
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-FEP-13A-SG



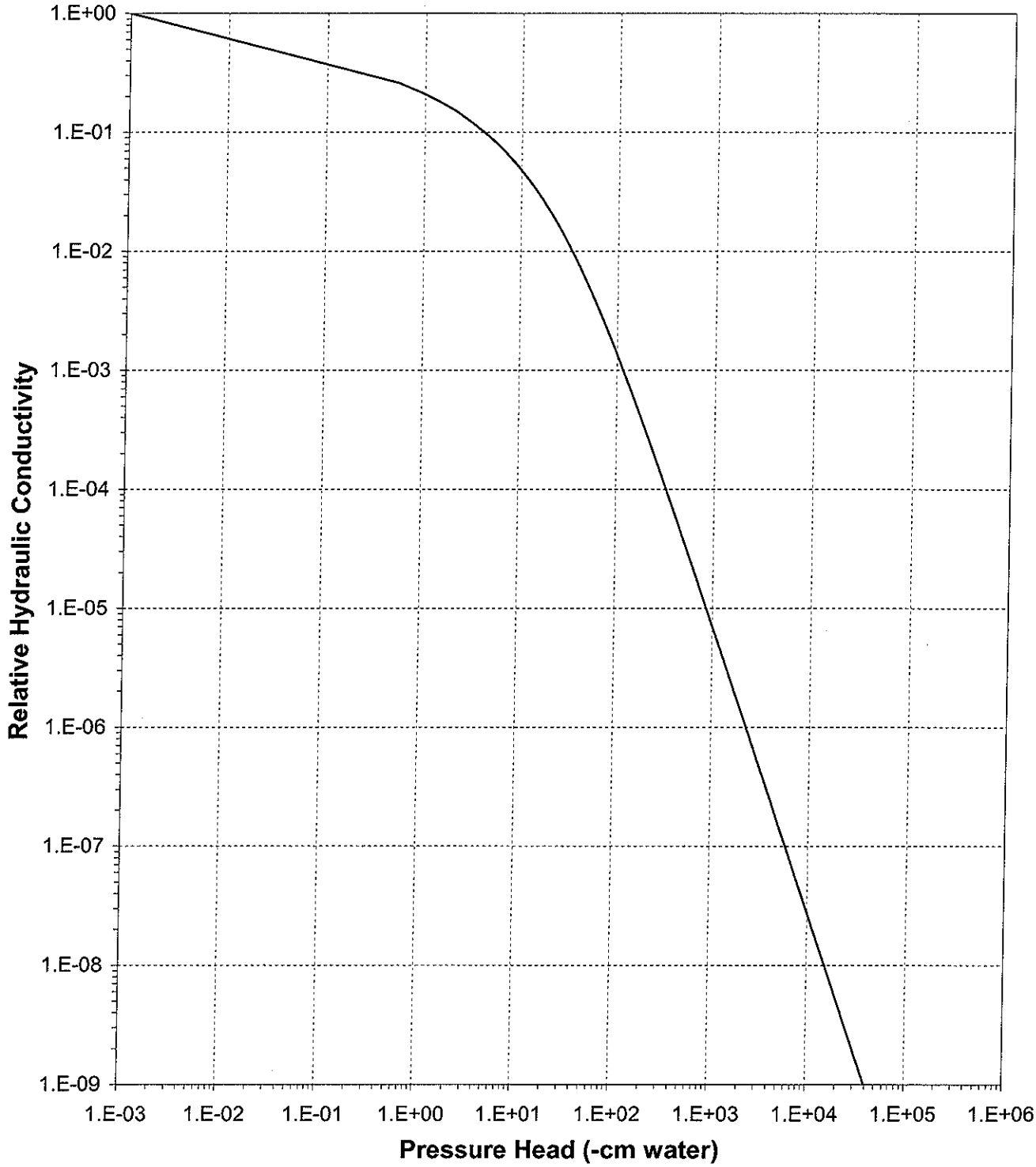
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-FEP-13A-SG



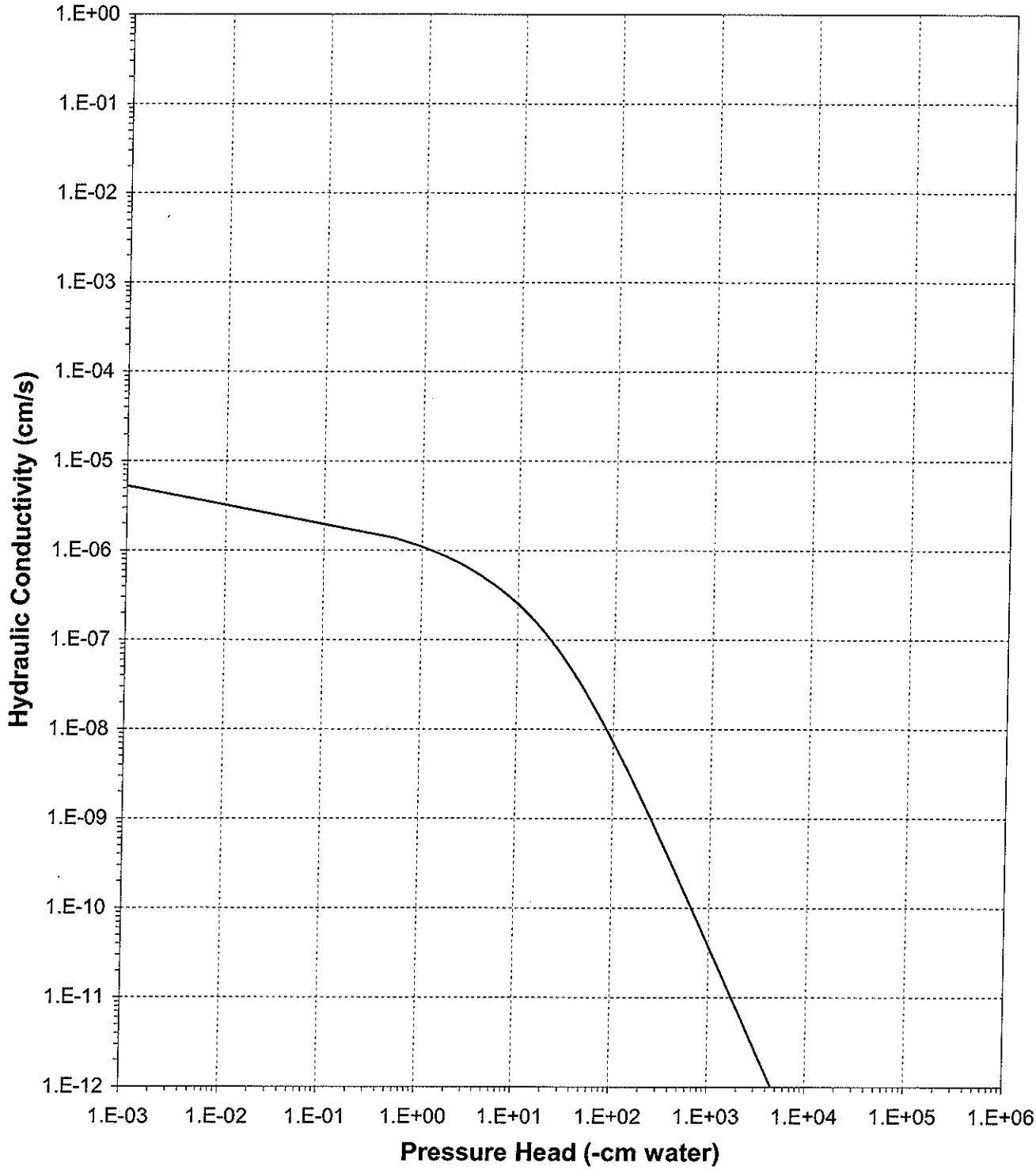
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-FEP-13A-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-FEP-13A-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13B-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 83.49
Tare wt., ring (g): 6.30
Tare wt., screen & clamp (g): 23.04
Initial sample volume (cm^3): 45.10
Initial dry bulk density (g/cm^3): 1.85
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 30.14

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content† (% vol)
Hanging column:	18-Nov-08	16:05	128.12	0.00	33.90
	24-Nov-08	10:35	127.80	47.50	33.19
	1-Dec-08	8:40	127.25	118.00	31.97
	8-Dec-08	9:55	126.74	217.00	30.84
Pressure plate:	17-Dec-08	9:40	125.94	448.71	29.07

Volume Adjusted Data[1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	47.50	---	---	---	---
	118.00	---	---	---	---
	217.00	---	---	---	---
Pressure plate:	448.71	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

‡ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: D. O'Dowd/ K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-FEP-13B-SG

Dry weight of dew point potentiometer sample* (g): 144.48
Tare weight, jar (g): 116.60
Initial sample bulk density (g/cm^3): 1.85

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)
Dew point potentiometer:	17-Nov-08	10:28	146.03	26310.8	10.28
	17-Nov-08	14:43	145.37	400781.4	5.91

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	26310.8	---	---	---	---
	400781.4	---	---	---	---

Dry weight of relative humidity box sample* (g): 69.05
Tare weight (g): 43.24
Initial sample bulk density (g/cm^3): 1.85

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)
Relative humidity box:	1-Dec-08	14:03	69.79	851293	5.31

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

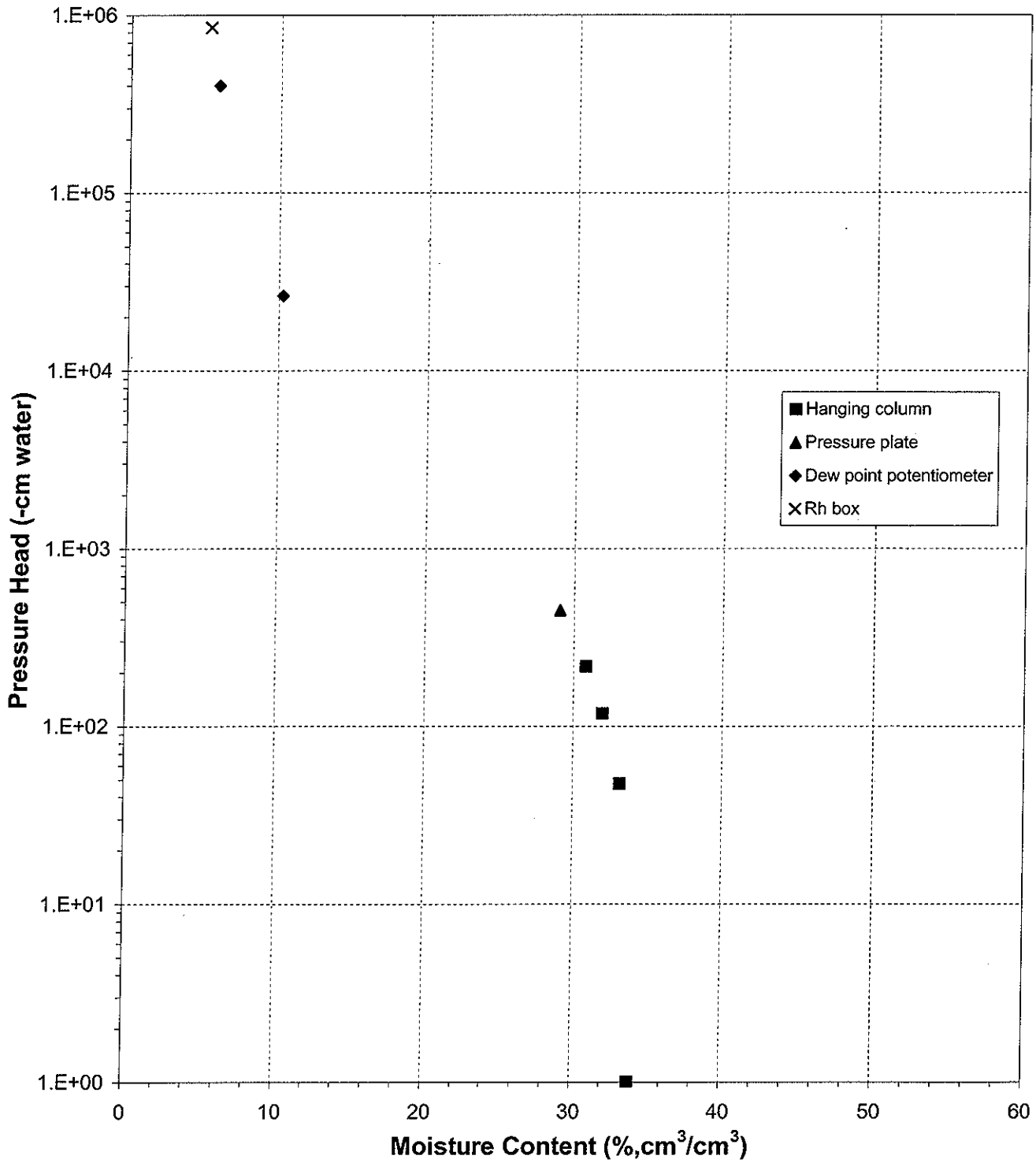
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

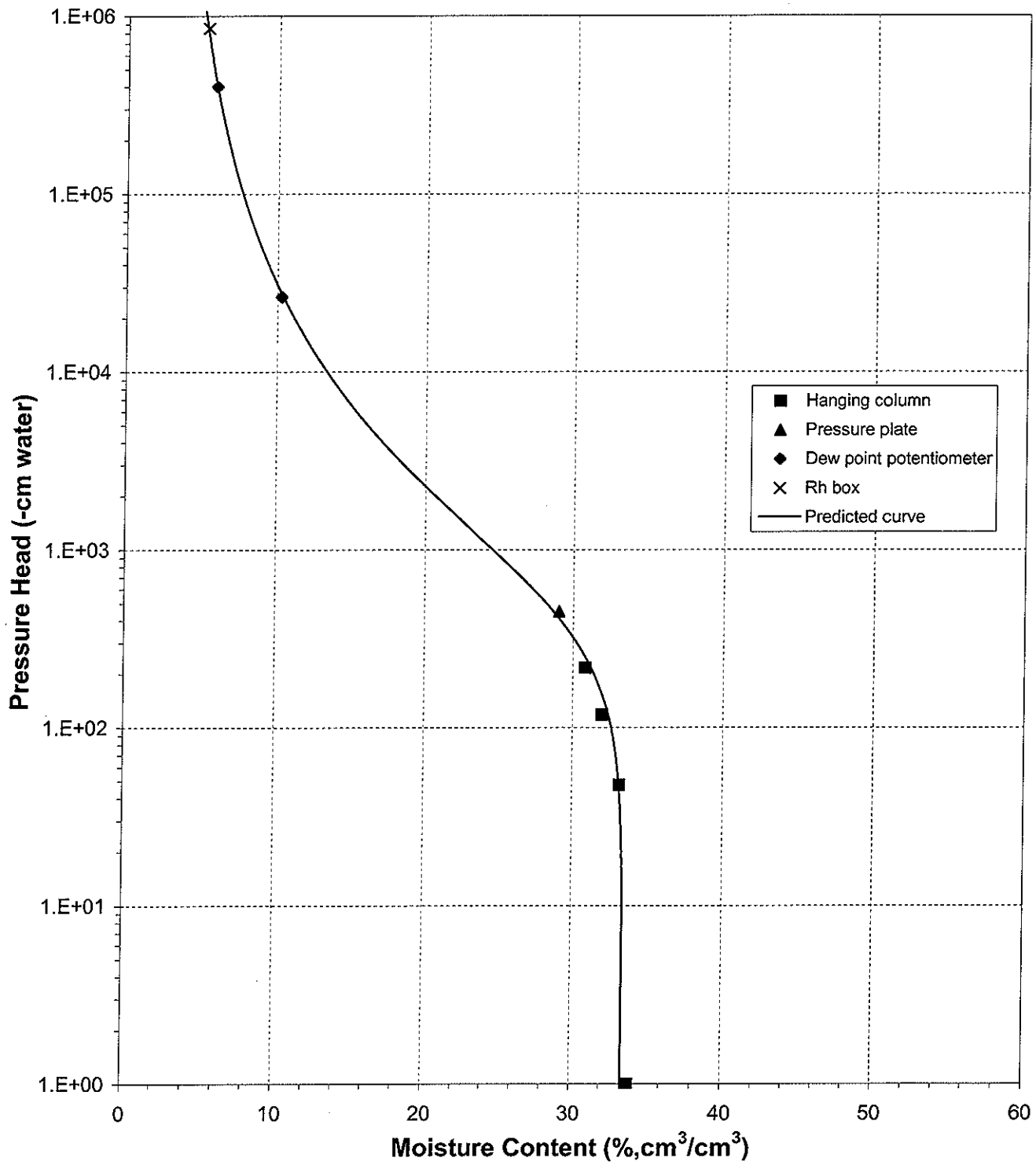
Water Retention Data Points

Sample Number: OU4-FEP-13B-SG



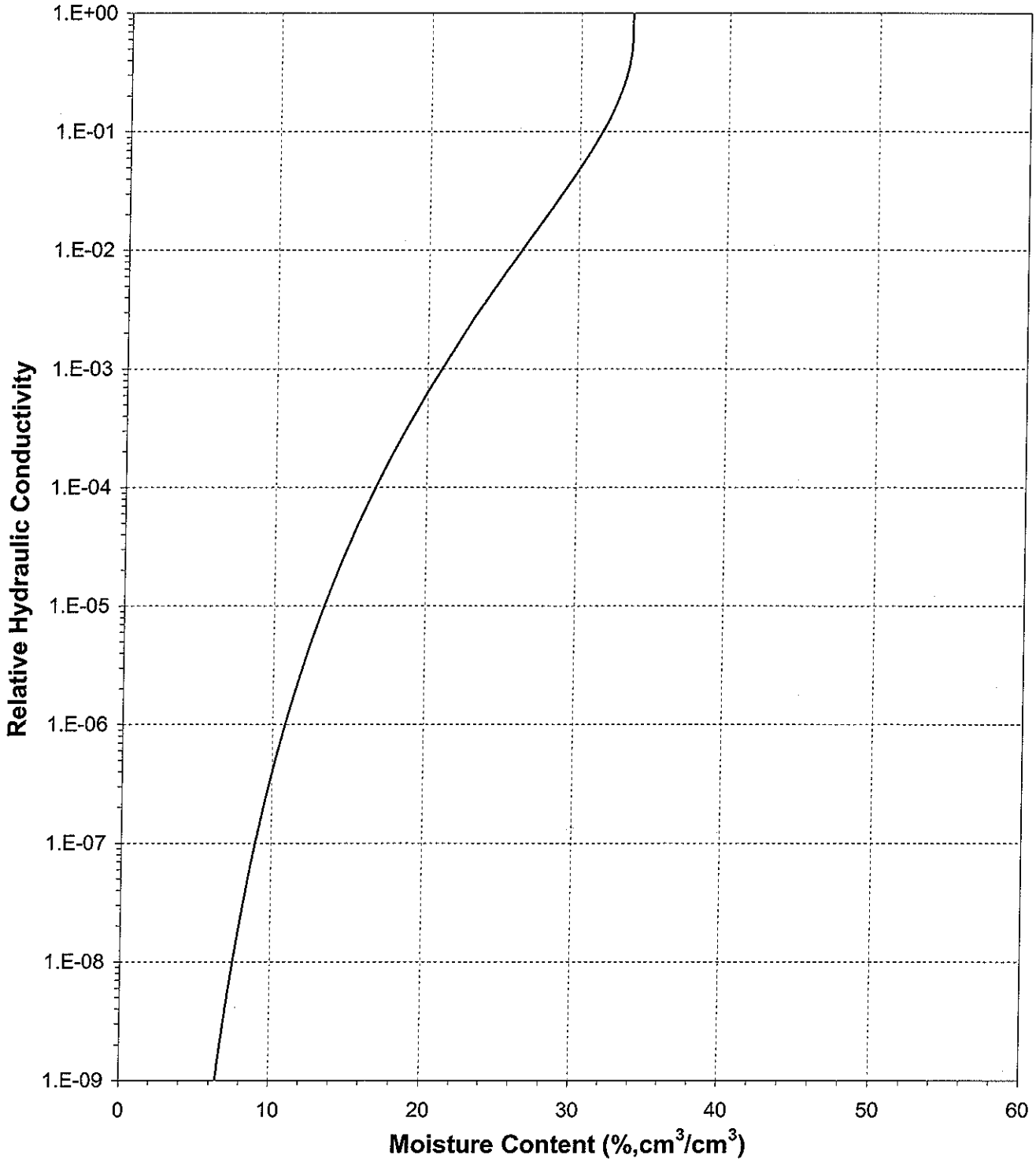
Predicted Water Retention Curve and Data Points

Sample Number: OU4-FEP-13B-SG



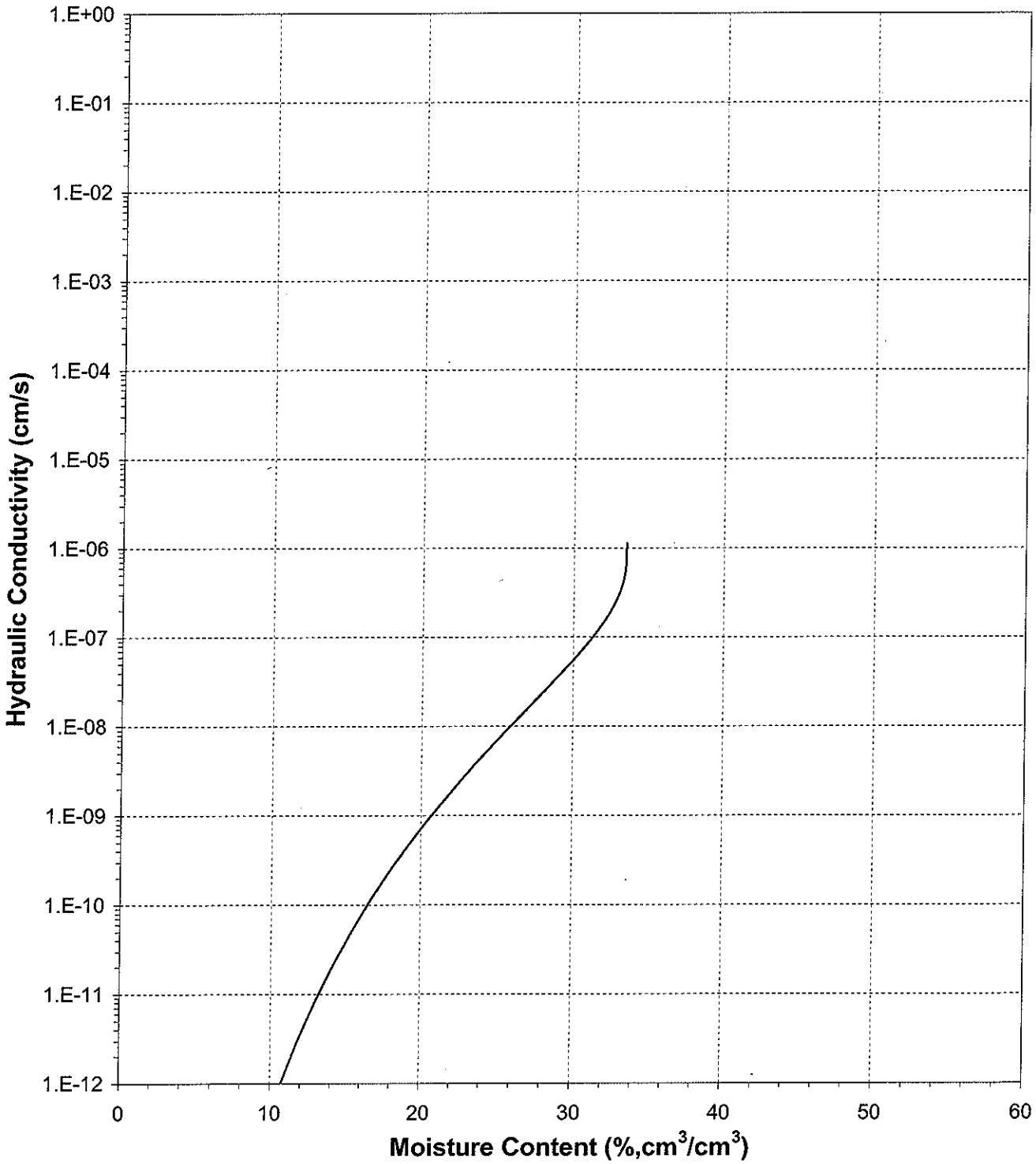
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-FEP-13B-SG



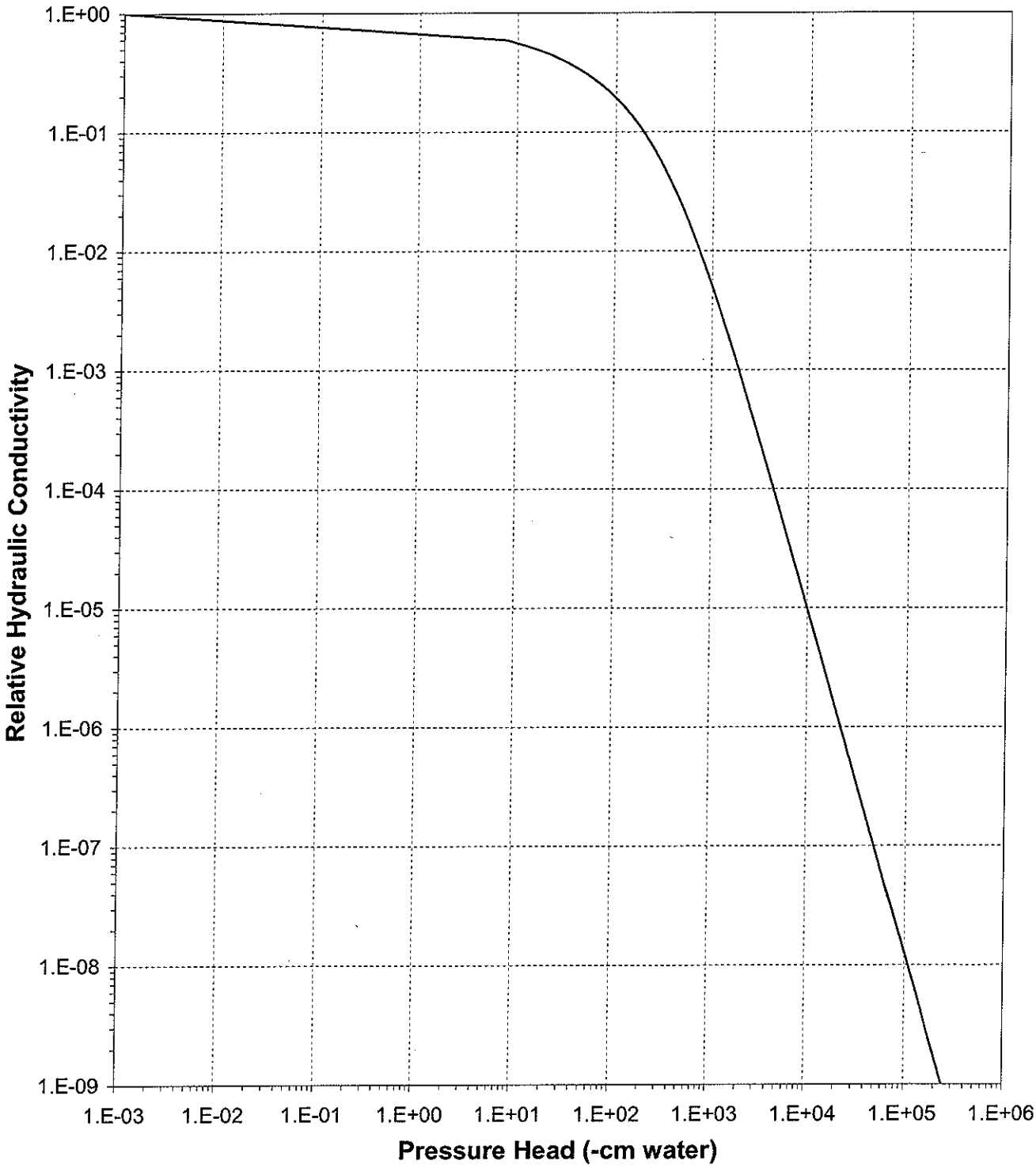
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-FEP-13B-SG



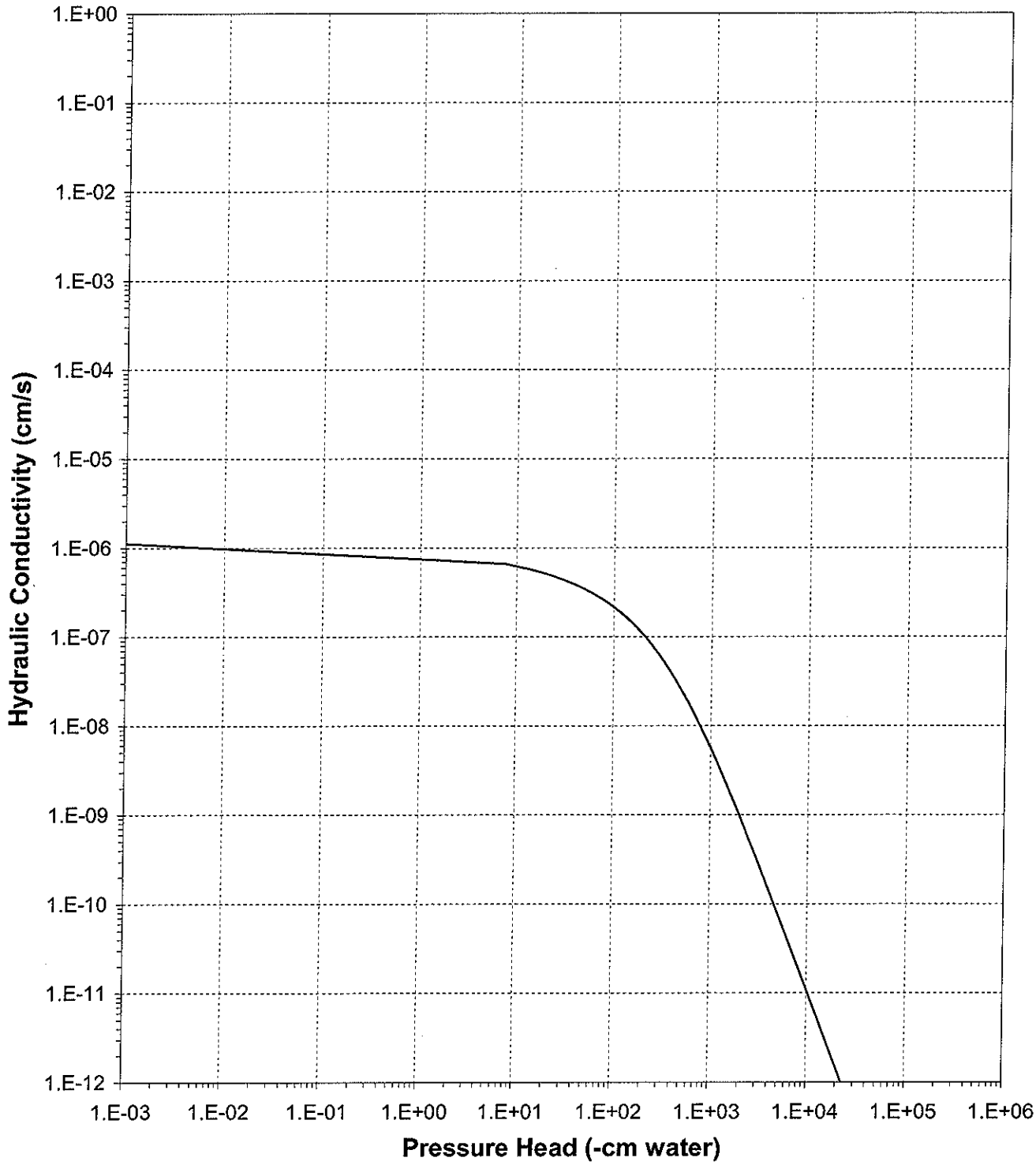
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-FEP-13B-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-FEP-13B-SG



Moisture Retention Data

Hanging Column / Pressure Plate

(Soil-Water Characteristic Curve)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15A-SG
Project Name: OU4-Phase I
Project Number: 136259

Dry wt. of sample (g): 150.01
Tare wt., ring (g): 50.69
Tare wt., screen & clamp (g): 25.69
Initial sample volume (cm^3): 82.18
Initial dry bulk density (g/cm^3): 1.83
Assumed particle density (g/cm^3): 2.65
Initial calculated total porosity (%): 31.12

	Date	Time	Weight* (g)	Matric Potential (-cm water)	Moisture Content † (% vol)
Hanging column:	19-Nov-08	15:00	251.58	0.00	30.65
	25-Nov-08	9:30	251.27	15.50	30.28
	1-Dec-08	9:00	249.17	59.00	27.72
	8-Dec-08	9:52	248.25	125.50	26.60
Pressure plate:	17-Dec-08	9:40	247.30	448.71	25.44

Volume Adjusted Data [1]

	Matric Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calculated Porosity (%)
Hanging column:	0.00	---	---	---	---
	15.50	---	---	---	---
	59.00	---	---	---	---
	125.50	---	---	---	---
Pressure plate:	448.71	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

† Assumed density of water is 1.0 g/cm^3

⌗ Volume adjustments are applicable at this matric potential (see comment #1).

Technician Notes:

Laboratory analysis by: D. O'Dowd/ K. Wright/ R. Marshall
Data entered by: C. Krous
Checked by: J. Hines

Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-FEP-15A-SG

Dry weight of dew point potentiometer sample* (g): 145.23
Tare weight, jar (g): 115.13
Initial sample bulk density (g/cm^3): 1.83

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content† (% vol)
Dew point potentiometer:	14-Nov-08	13:35	146.93	169286.8	10.30

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	169286.8	---	---	---	---

Dry weight of relative humidity box sample* (g): 77.65
Tare weight (g): 44.41
Initial sample bulk density (g/cm^3): 1.83

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content† (% vol)
Relative humidity box:	26-Nov-08	10:30	78.58	851293	5.11

Volume Adjusted Data[1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change[2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '—' denotes no volume change occurred.

* Weight including tares

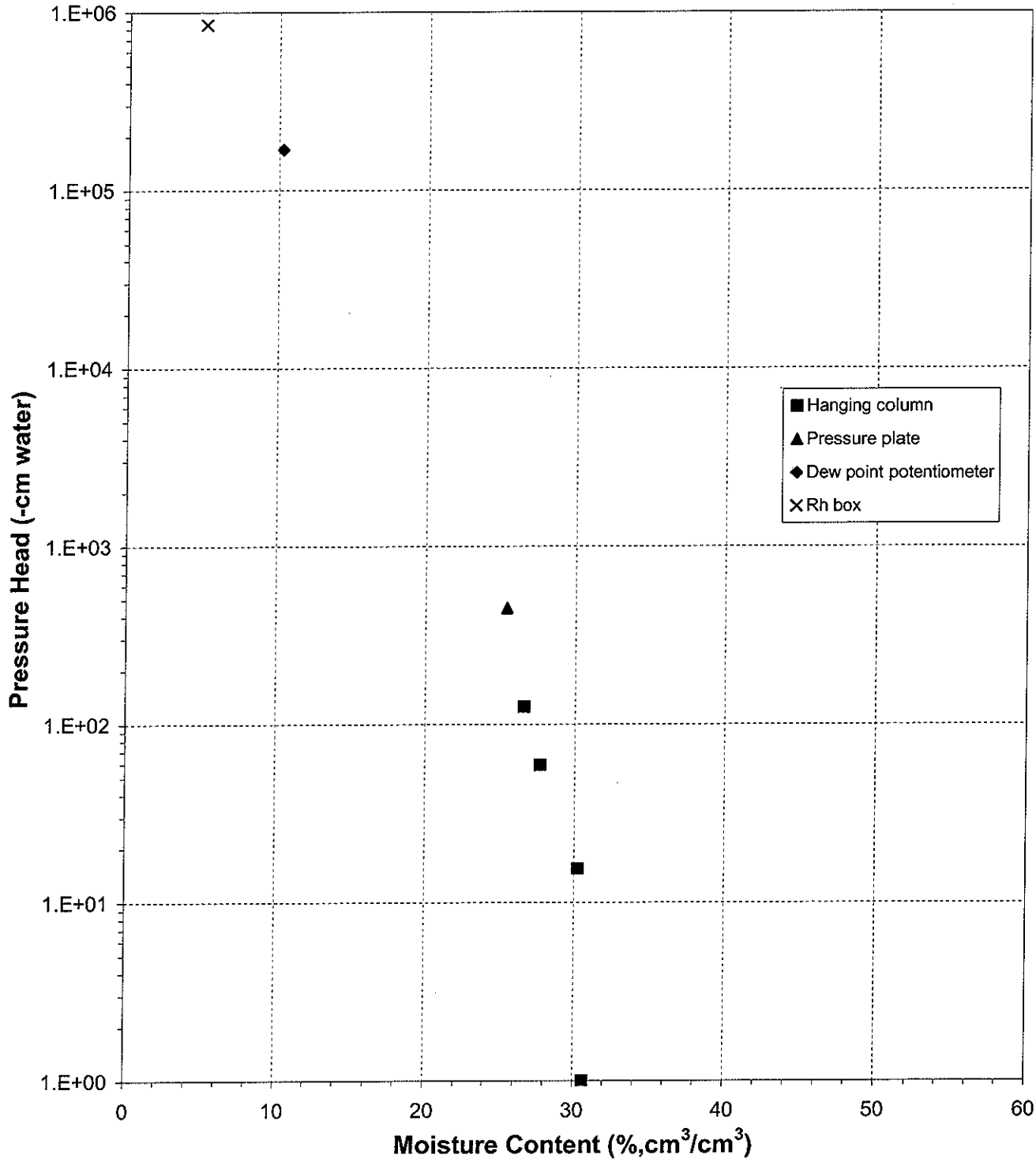
† Assumed density of water is 1.0 g/cm^3

Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

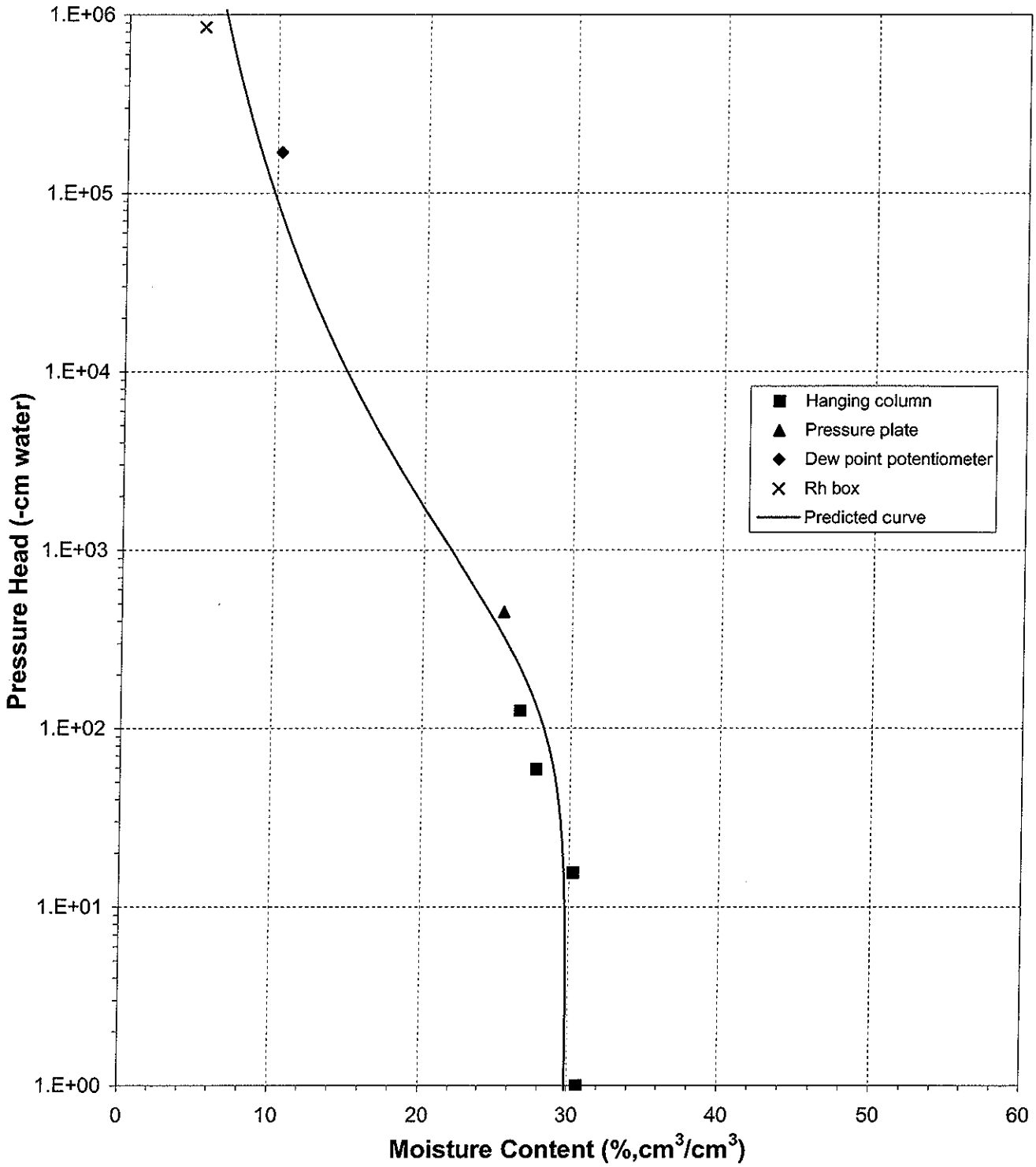
Water Retention Data Points

Sample Number: OU4-FEP-15A-SG



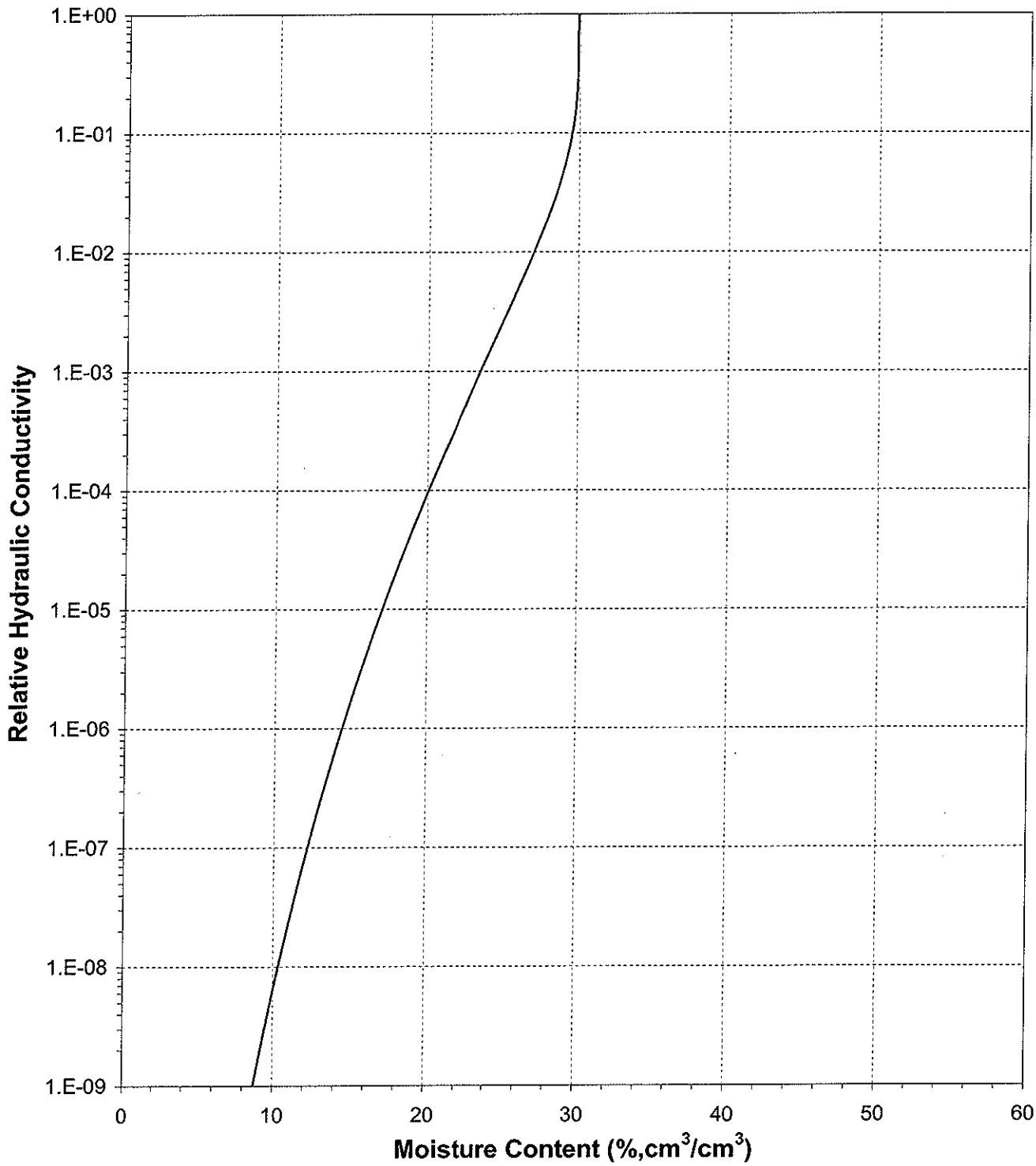
Predicted Water Retention Curve and Data Points

Sample Number: OU4-FEP-15A-SG



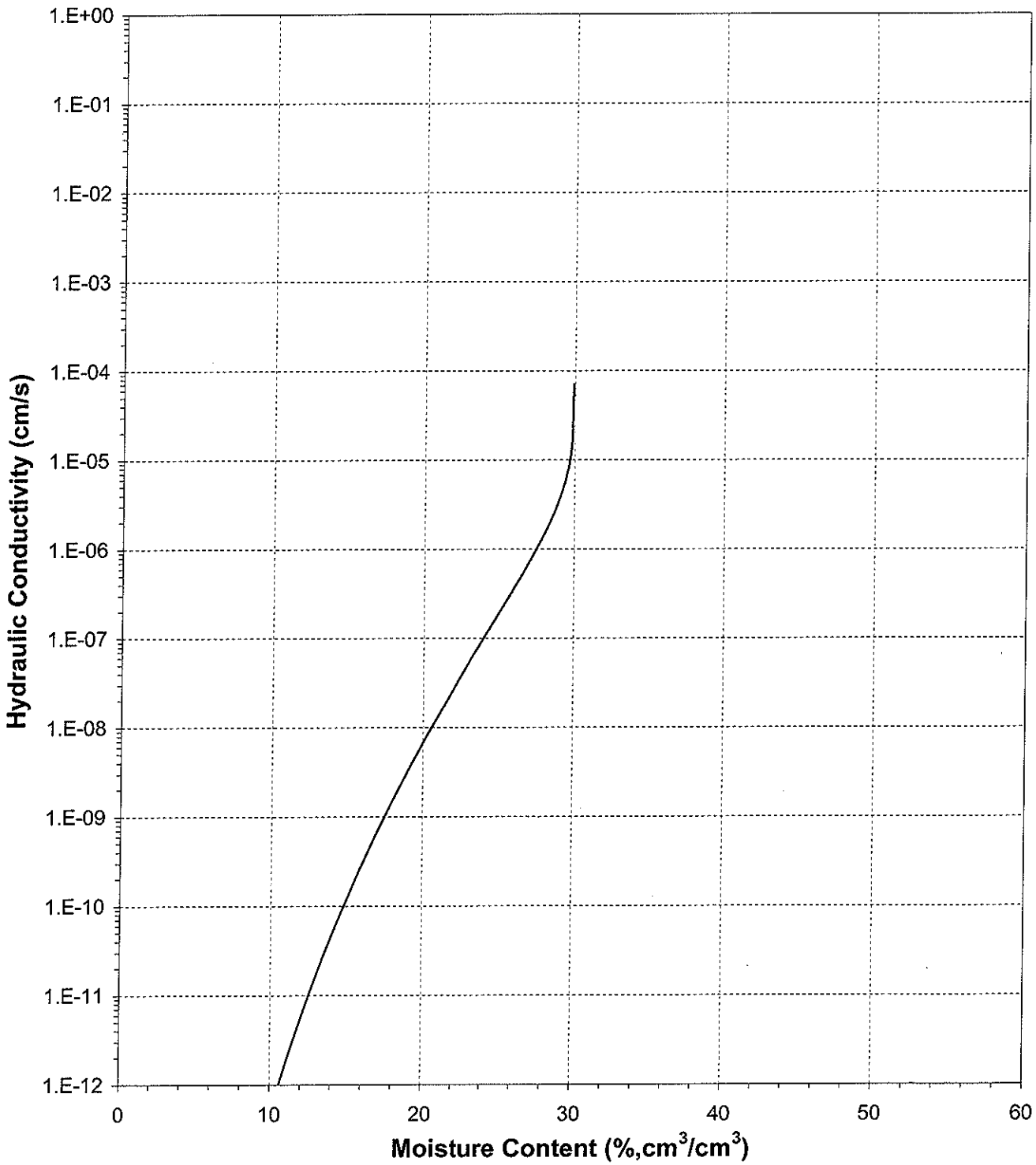
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-FEP-15A-SG



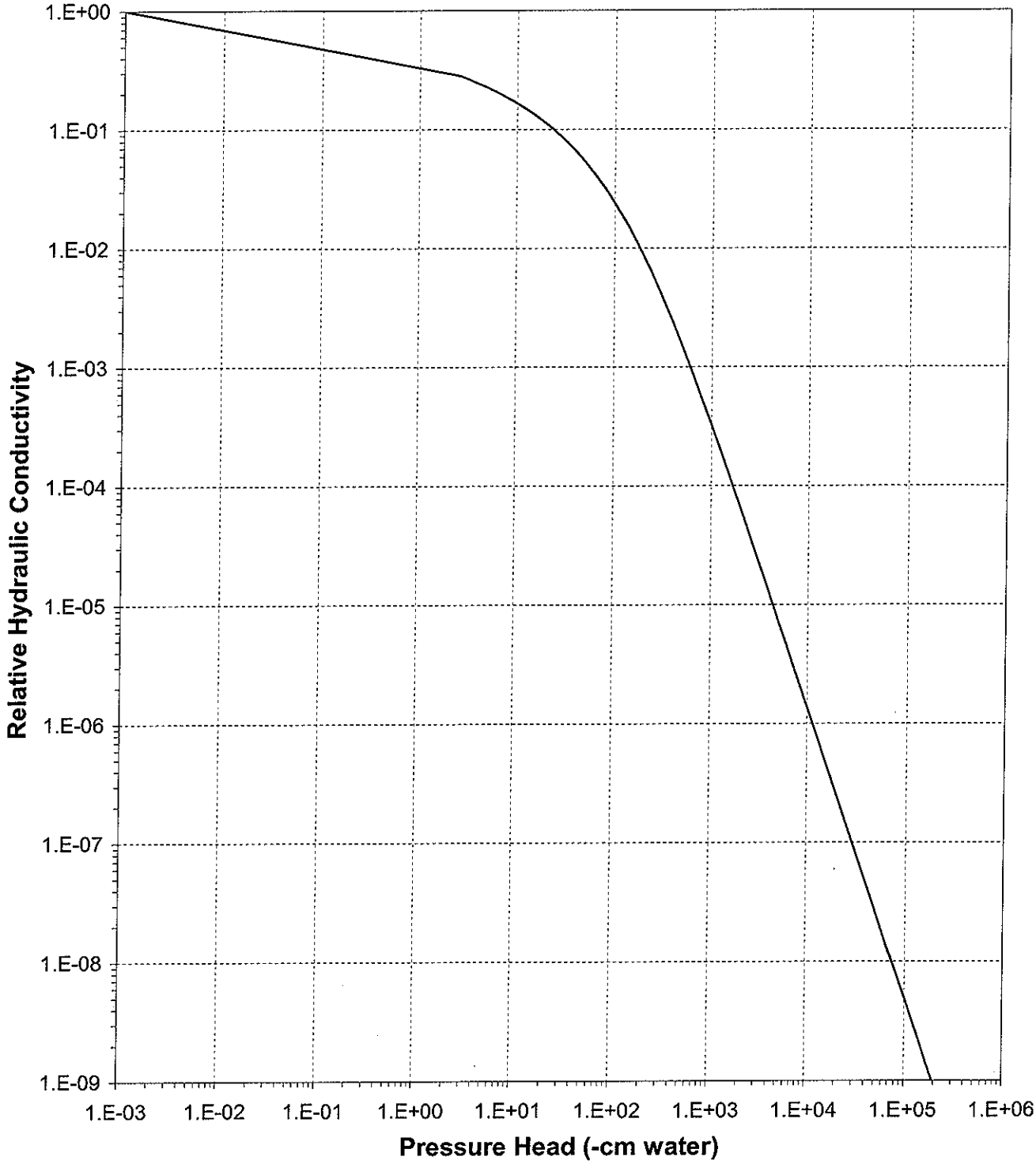
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-FEP-15A-SG



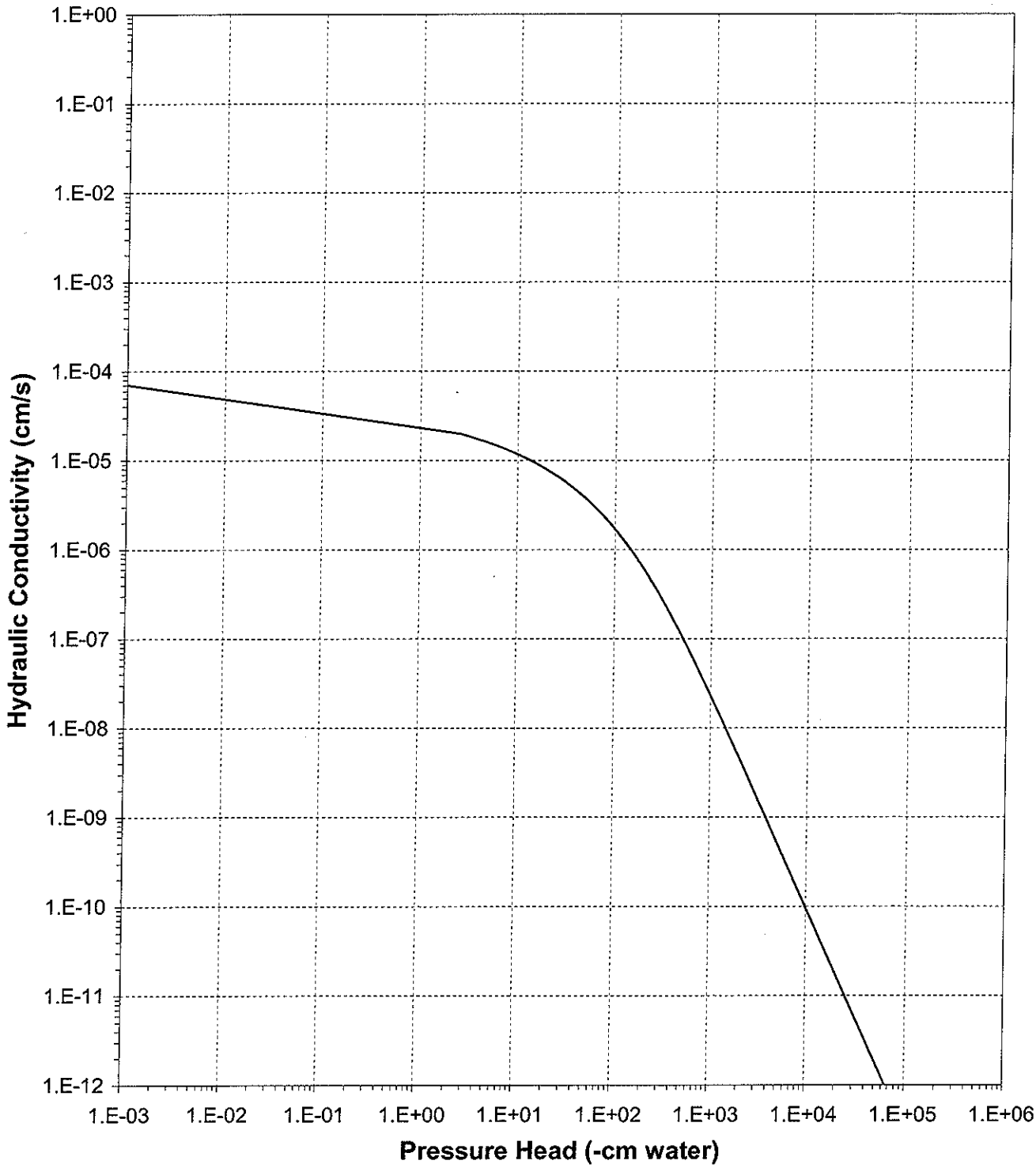
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-FEP-15A-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-FEP-15A-SG



Moisture Retention Data

Dew Point Potentiometer / Relative Humidity Box

(Soil-Water Characteristic Curve)

Sample Number: OU4-FEP-15B-SG

Dry weight of dew point potentiometer sample* (g): 145.71
Tare weight, jar (g): 116.38
Initial sample bulk density (g/cm^3): 1.64

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Content † (% vol)
Dew point potentiometer:	17-Nov-08	15:49	147.53	42321.7	10.17
	14-Nov-08	14:47	146.91	235573.8	6.72

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Dew point potentiometer:	42321.7	---	---	---	---
	235573.8	---	---	---	---

Dry weight of relative humidity box sample* (g): 65.50
Tare weight (g): 38.03
Initial sample bulk density (g/cm^3): 1.64

	Date	Time	Weight* (g)	Water Potential (-cm water)	Moisture Moisture Content † (% vol)
Relative humidity box:	26-Nov-08	10:30	66.28	851293	4.66

Volume Adjusted Data [1]

	Water Potential (-cm water)	Adjusted Volume (cm^3)	% Volume Change [2] (%)	Adjusted Density (g/cm^3)	Adjusted Calc. Porosity (%)
Relative humidity box:	851293	---	---	---	---

Comments:

[1] Applicable if the sample experienced volume changes during testing. 'Volume Adjusted' values represent each of the volume change measurements obtained after saturated hydraulic conductivity testing and throughout hanging column/pressure plate testing. "---" indicates no volume changes occurred.

[2] Represents percent volume change from original sample volume. A '+' denotes measured sample swelling, a '-' denotes measured sample settling, and '---' denotes no volume change occurred.

* Weight including tares

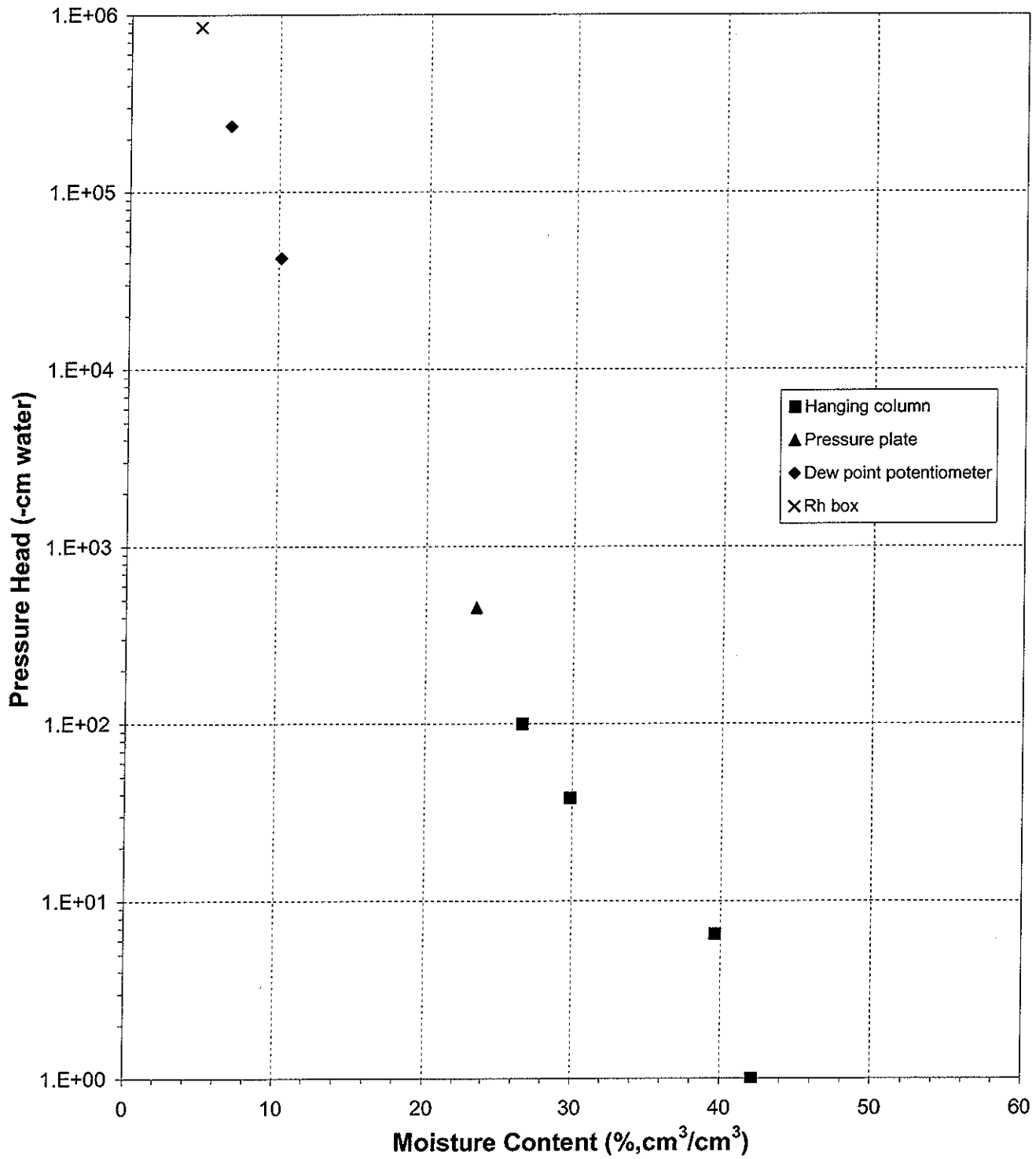
† Assumed density of water is 1.0 g/cm^3

‡‡ Volume adjustments are applicable at this matric potential (see comment #1).

Laboratory analysis by: T. Mendez
Data entered by: C. Krous
Checked by: J. Hines

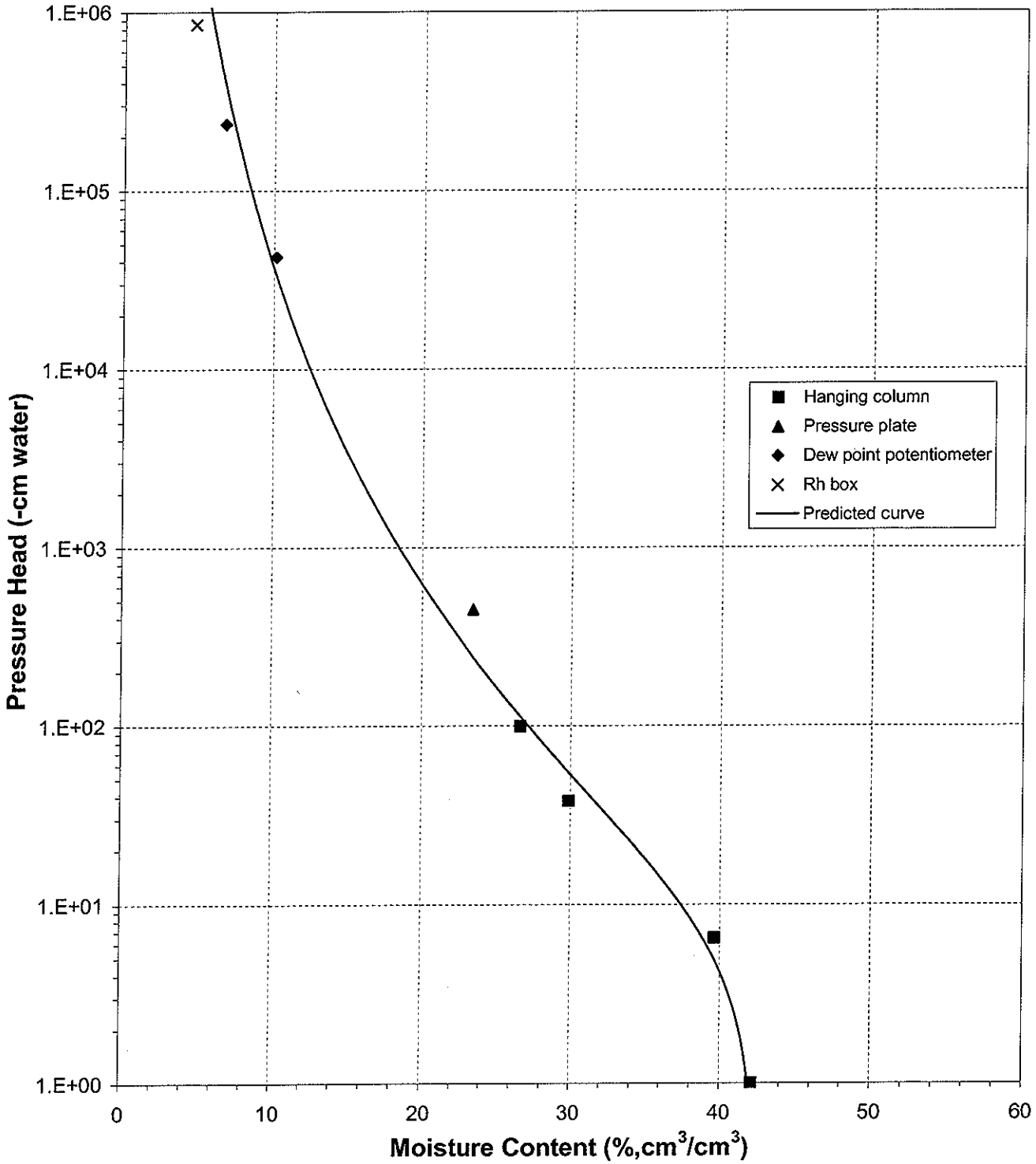
Water Retention Data Points

Sample Number: OU4-FEP-15B-SG



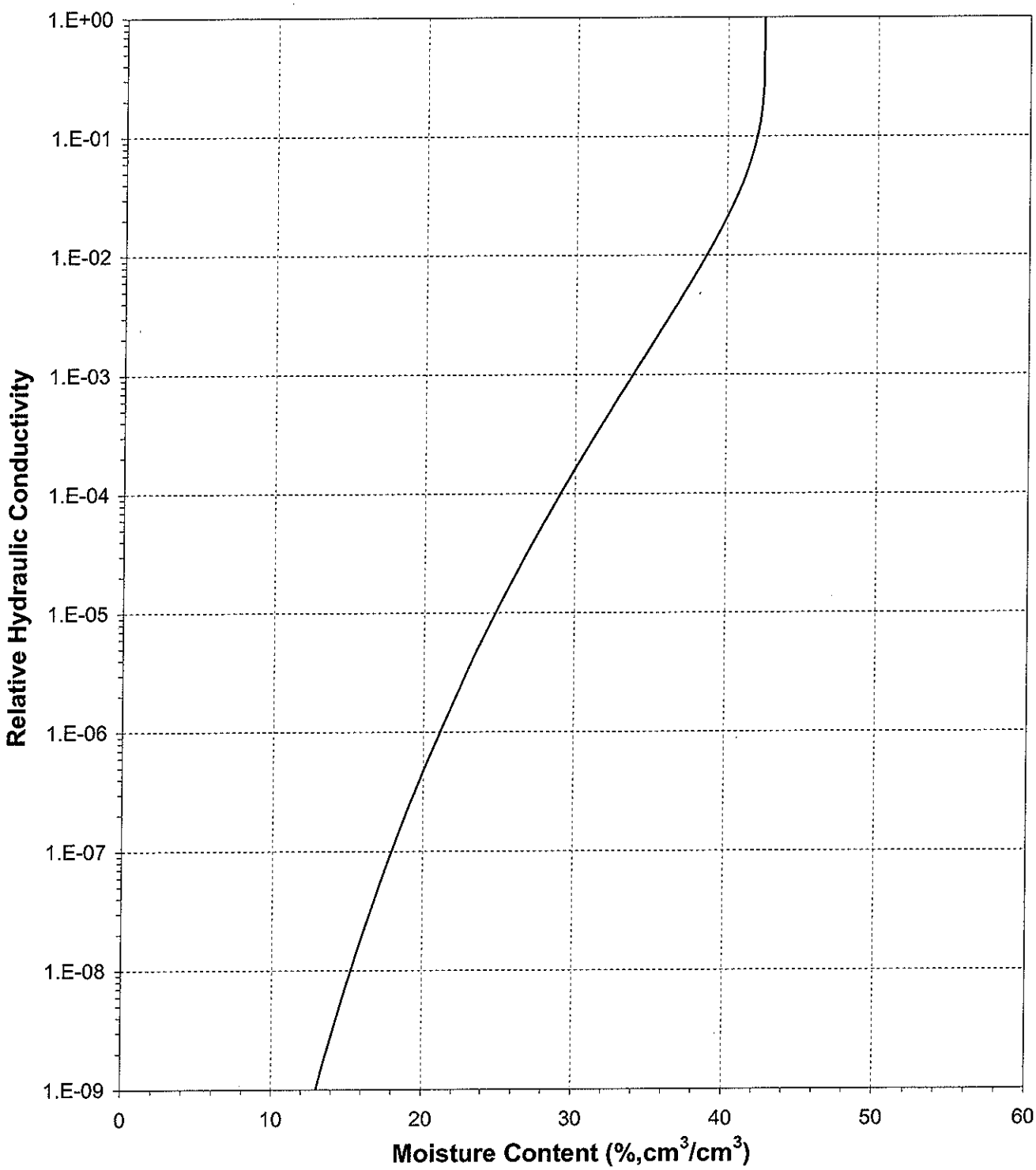
Predicted Water Retention Curve and Data Points

Sample Number: OU4-FEP-15B-SG



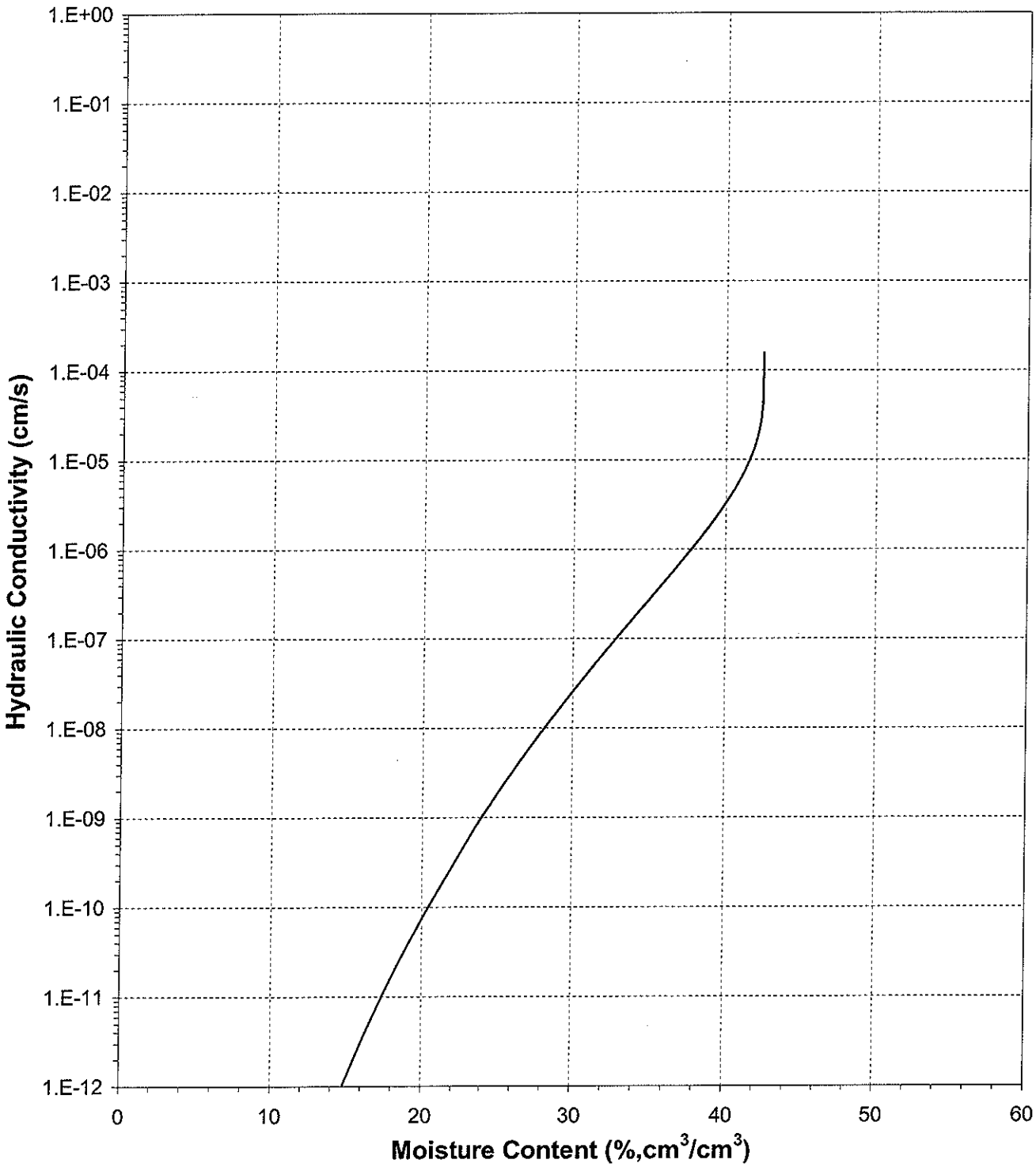
Plot of Relative Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-FEP-15B-SG



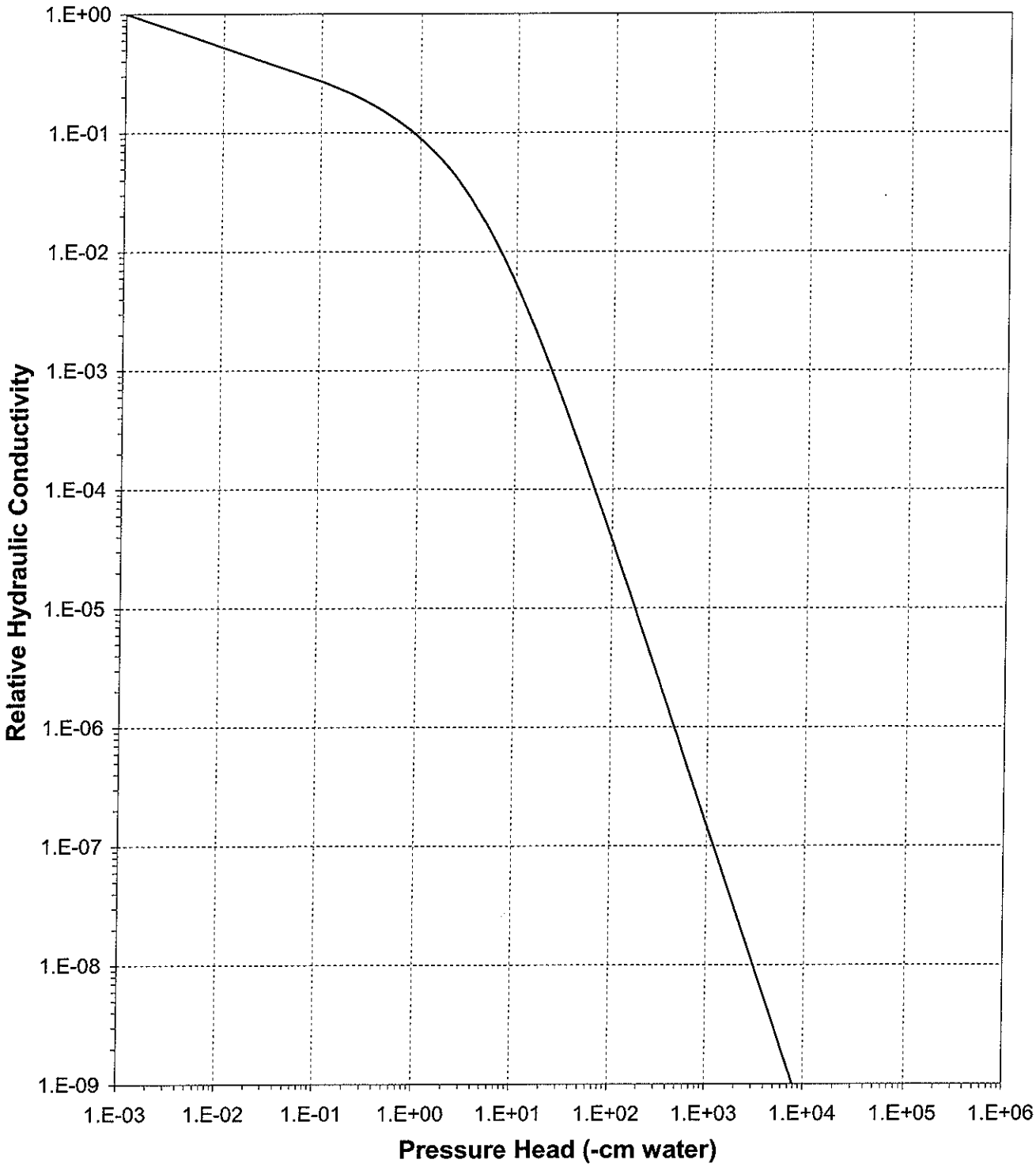
Plot of Hydraulic Conductivity vs Moisture Content

Sample Number: OU4-FEP-15B-SG



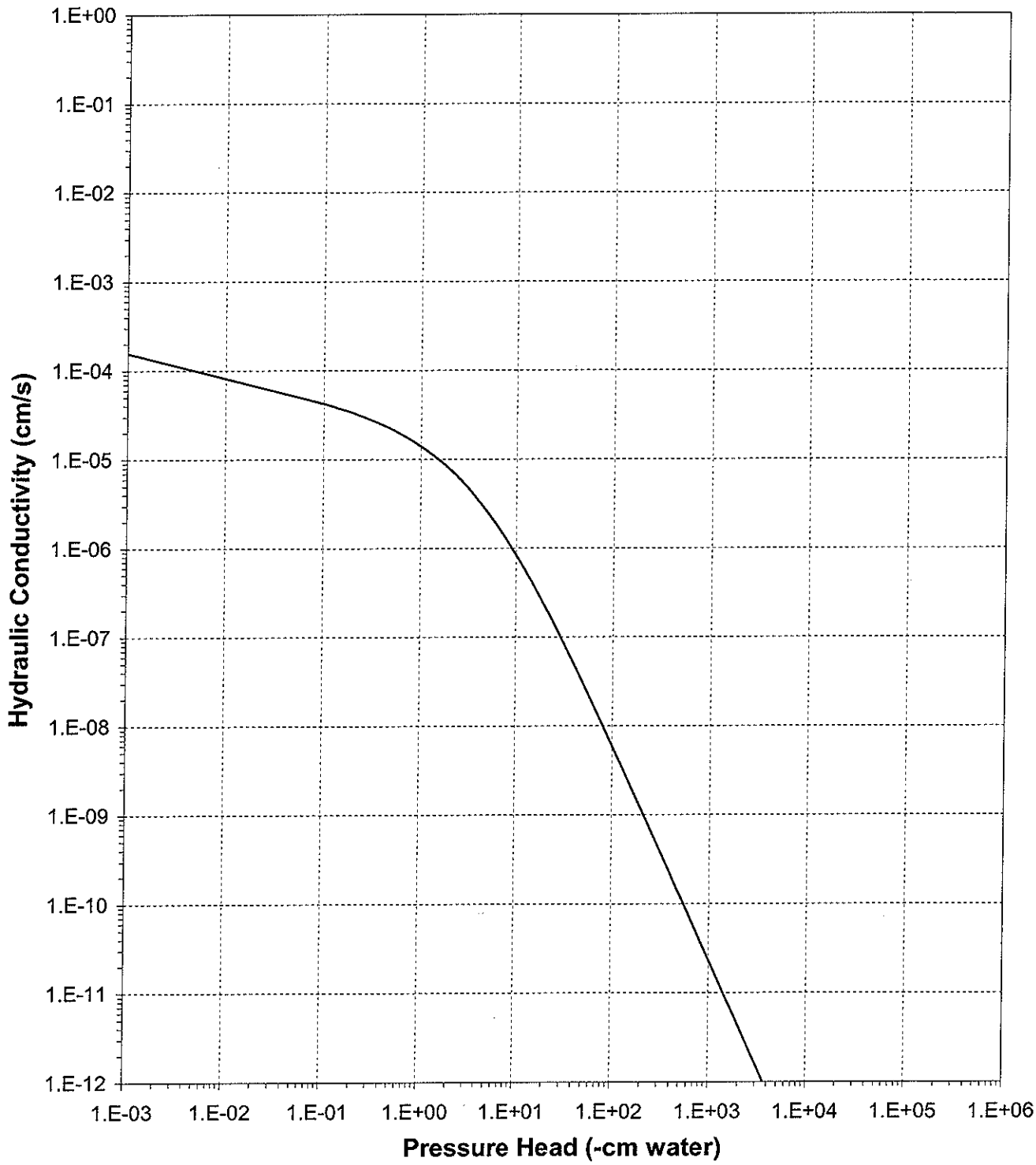
Plot of Relative Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-FEP-15B-SG



Plot of Hydraulic Conductivity vs Pressure Head

Sample Number: OU4-FEP-15B-SG



Particle Size Analysis

Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification	
OU4-LEP-10A-SG	7.2E-05	0.0027	0.0054	75	0.81	WS/H	Fat clay with sand (CH)s	Clay	(Est)
OU4-LEP-10B-SG	0.0010	0.011	0.027	27	0.85	WS/H	Sandy lean clay s(CL)	Loam	(Est)
OU4-FEP-13A-SG	0.036	0.22	0.31	8.6	1.3	WS/H	Silty sand (SM)	Sand †	
OU4-FEP-13B-SG	0.0095	0.26	0.47	49	3.2	WS/H	Silty sand (SM)	Sandy Loam †	
OU4-FEP-15A-SG	0.021	0.41	0.64	30	2.2	WS/H	Silty sand (SM)	Loamy Sand †	
OU4-FEP-15B-SG	0.022	0.51	0.89	40	1.3	WS/H	Silty sand with gravel (SM)g	Loamy Sand †	

d_{50} = Median particle diameter

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10A-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 25-Nov-08

Initial Dry Weight of Sample (g): 132.52
Weight Passing #10 (g): 132.52
Weight Retained #10 (g): 0.00
Weight of Hydrometer Sample (g): 48.44
Calculated Weight of Sieve Sample (g): 48.44

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	132.52	100.00
	2"	50	0.00	0.00	132.52	100.00
	1.5"	38.1	0.00	0.00	132.52	100.00
	1"	25	0.00	0.00	132.52	100.00
	3/4"	19.0	0.00	0.00	132.52	100.00
	3/8"	9.5	0.00	0.00	132.52	100.00
	4	4.75	0.00	0.00	132.52	100.00
	10	2.00	0.00	0.00	132.52	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.22	0.22	48.22	99.55
	40	0.425	0.90	1.12	47.32	97.69
	60	0.250	2.78	3.90	44.54	91.95
	140	0.106	5.30	9.20	39.24	81.01
	200	0.075	0.66	9.86	38.58	79.64
	dry pan		0.02	9.88	38.56	
	wet pan			38.56	0.00	

d_{10} (mm): 7.2E-05
d_{16} (mm): 0.00013
d_{30} (mm): 0.00056
d_{50} (mm): 0.0027
d_{60} (mm): 0.0054
d_{84} (mm): 0.13

Median Particle Diameter--d_{50} (mm): 0.0027
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 75
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 0.81
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.044

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Classification of fines: CH

ASTM Soil Classification: Fat clay with sand (CH)s
USDA Soil Classification: Clay

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 17-Nov-08
Start Time: 9:18

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

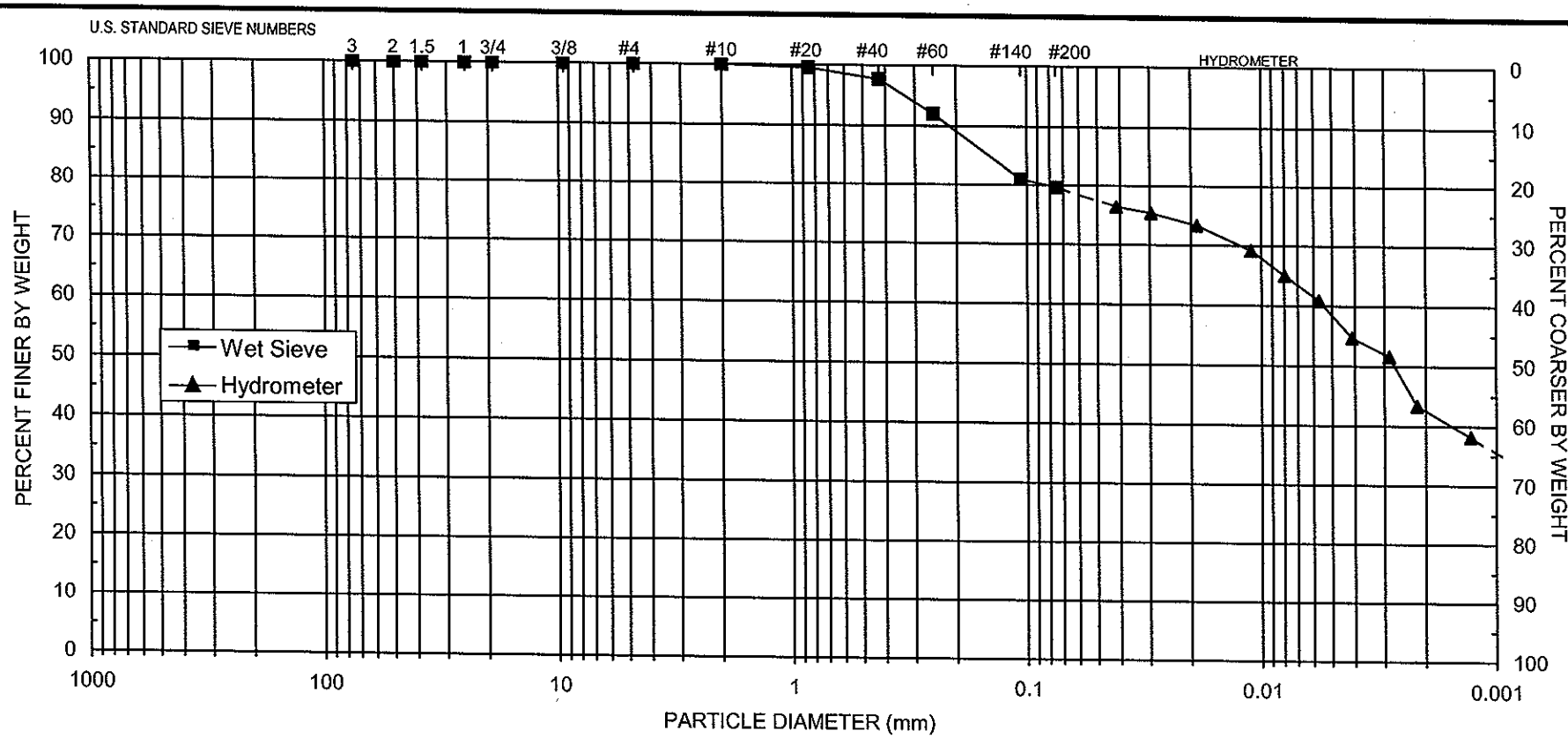
Initial Wt. (g): 48.44
Total Sample Wt. (g): 132.52
Wt. Passing #10 (g): 132.52

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
17-Nov-08	1	19.8	43.0	6.0	37.0	9.3	0.04157	76.4	76.4
	2	19.8	42.5	6.0	36.5	9.3	0.02953	75.4	75.4
	5	19.8	41.5	6.0	35.5	9.5	0.01884	73.3	73.3
	15	19.8	39.5	6.0	33.5	9.8	0.01106	69.2	69.2
	30	19.8	37.5	6.0	31.5	10.2	0.00795	65.0	65.0
	60	20.0	35.5	6.0	29.5	10.5	0.00570	60.9	60.9
	120	20.1	32.5	6.0	26.5	11.0	0.00411	54.7	54.7
	250	20.8	31.0	6.0	25.0	11.2	0.00286	51.6	51.6
	450	21.3	27.0	6.0	21.0	11.9	0.00218	43.4	43.4
18-Nov-08	1390	19.5	25.0	6.5	18.5	12.2	0.00129	38.2	38.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **7.2E-05**	d_{30} = **0.00056**	d_{50} = **0.0027**	d_{60} = **0.0054**	C_u = **75**	C_c = **0.81**

SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION	USDA CLASSIFICATION
OU4-LEP-10A-SG	**136259**	**Fat clay with sand (CH)s**	**Clay**

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10B-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 25-Nov-08

Initial Dry Weight of Sample (g): 278.73
Weight Passing #10 (g): 257.00
Weight Retained #10 (g): 21.73
Weight of Hydrometer Sample (g): 48.97
Calculated Weight of Sieve Sample (g): 53.11

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	278.73	100.00
	2"	50	0.00	0.00	278.73	100.00
	1.5"	38.1	0.00	0.00	278.73	100.00
	1"	25	0.00	0.00	278.73	100.00
	3/4"	19.0	0.00	0.00	278.73	100.00
	3/8"	9.5	0.00	0.00	278.73	100.00
	4	4.75	5.56	5.56	273.17	98.01
	10	2.00	16.17	21.73	257.00	92.20
-10			(Based on calculated sieve wt.)			
	20	0.85	0.34	4.48	48.63	91.56
	40	0.425	1.53	6.01	47.10	88.68
	60	0.250	2.72	8.73	44.38	83.56
	140	0.106	8.24	16.97	36.14	68.05
	200	0.075	2.40	19.37	33.74	63.53
	dry pan		0.16	19.53	33.58	
	wet pan			33.58	0.00	

d_{10} (mm): 0.0010
d_{16} (mm): 0.0018
d_{30} (mm): 0.0048
d_{50} (mm): 0.011
d_{60} (mm): 0.027
d_{84} (mm): 0.26

Median Particle Diameter--d_{50} (mm): 0.011
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 27
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 0.85
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.091

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Classification of fines: CL

ASTM Soil Classification: Sandy lean clay s(CL)
USDA Soil Classification: Loam

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 6-Jan-09
Start Time: 9:00

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

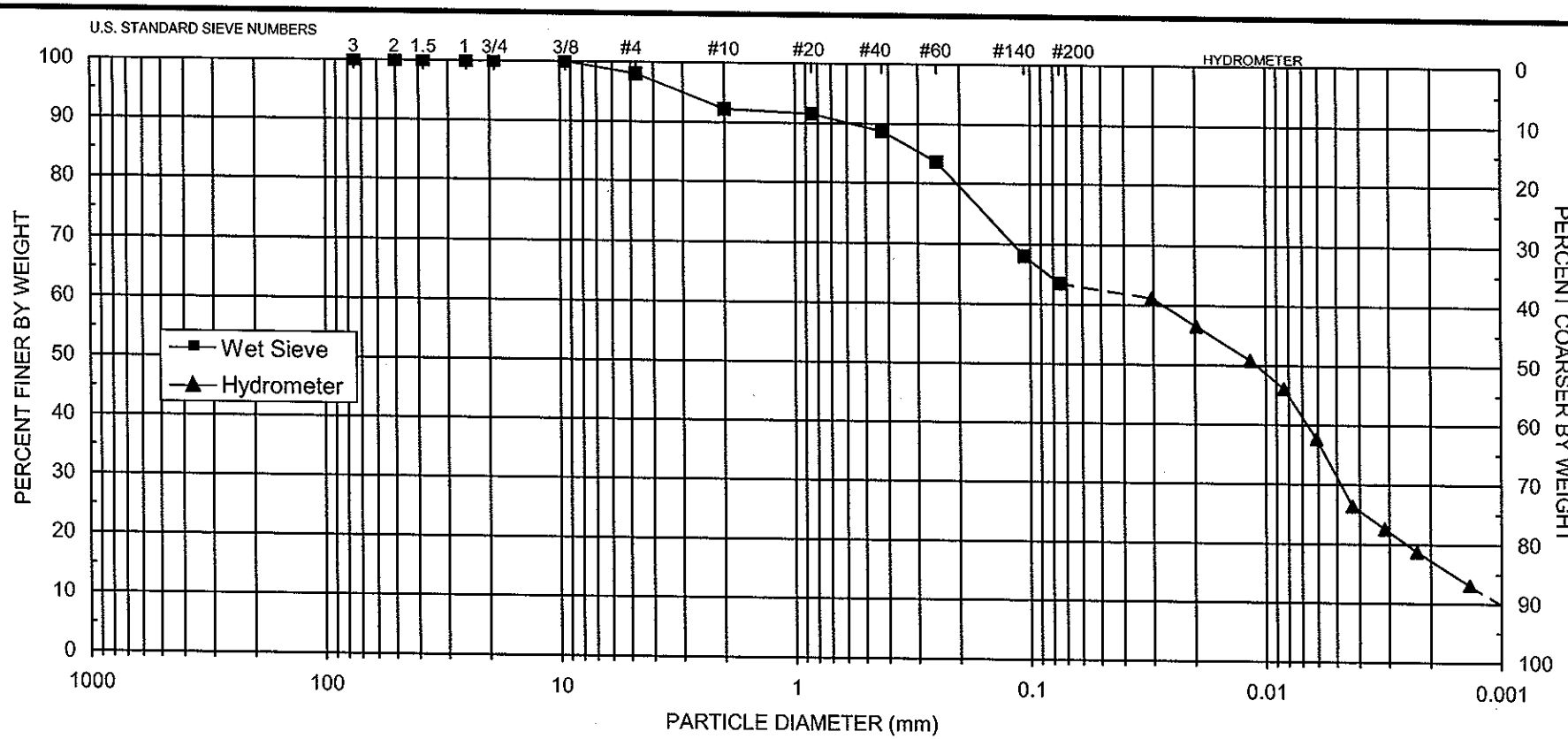
Initial Wt. (g)*:* 48.97
Total Sample Wt. (g)*:* 278.73
Wt. Passing #10 (g): 257.00

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
6-Jan-09	2	19.2	39.5	7.0	32.5	9.8	0.03052	66.4	61.2
	5	19.2	37.0	7.0	30.0	10.2	0.01970	61.3	56.5
	15	19.2	34.0	7.0	27.0	10.7	0.01164	55.1	50.8
	30	19.3	31.5	7.0	24.5	11.1	0.00838	50.0	46.1
	60	19.5	27.0	7.0	20.0	11.9	0.00610	40.8	37.7
	131	19.7	20.5	6.5	14.0	12.9	0.00430	28.6	26.4
	250	20.4	18.0	6.0	12.0	13.3	0.00313	24.5	22.6
	470	21.3	16.0	6.0	10.0	13.7	0.00229	20.4	18.8
7-Jan-09	1410	19.6	14.0	7.0	7.0	14.0	0.00137	14.3	13.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.0010**	d_{30} = **0.0048**	d_{50} = **0.011**	d_{60} = **0.027**	C_u = **27**	C_c = **0.85**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-LEP-10B-SG	**136259**	**Sandy lean clay s(CL)**		**Loam**	

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13A-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 25-Nov-08

Initial Dry Weight of Sample (g): 303.63
Weight Passing #10 (g): 269.91
Weight Retained #10 (g): 33.72
Weight of Hydrometer Sample (g): 52.83
Calculated Weight of Sieve Sample (g): 59.43

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	303.63	100.00
	2"	50	0.00	0.00	303.63	100.00
	1.5"	38.1	0.00	0.00	303.63	100.00
	1"	25	0.00	0.00	303.63	100.00
	3/4"	19.0	0.00	0.00	303.63	100.00
	3/8"	9.5	1.34	1.34	302.29	99.56
	4	4.75	7.02	8.36	295.27	97.25
	10	2.00	25.36	33.72	269.91	88.89
-10			(Based on calculated sieve wt.)			
	20	0.85	5.22	11.82	47.61	80.11
	40	0.425	6.80	18.62	40.81	68.67
	60	0.250	8.96	27.58	31.85	53.59
	140	0.106	16.74	44.32	15.11	25.42
	200	0.075	3.83	48.15	11.28	18.98
	dry pan		0.71	48.86	10.57	
	wet pan			10.57	0.00	

d_{10} (mm): 0.036
d_{16} (mm): 0.064
d_{30} (mm): 0.12
d_{50} (mm): 0.22
d_{60} (mm): 0.31
d_{84} (mm): 1.2

Median Particle Diameter--d_{50} (mm): 0.22
Uniformity Coefficient, Cu--[d_{60}/d_{10}] (mm): 8.6
Coefficient of Curvature, Cc--[$(d_{30})^2/(d_{10}*d_{60})$] (mm): 1.3
Mean Particle Diameter--[$(d_{16}+d_{50}+d_{84})/3$] (mm): 0.49

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Sand †

† Greater than 10% of sample is coarse material

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 17-Nov-08
Start Time: 9:12

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

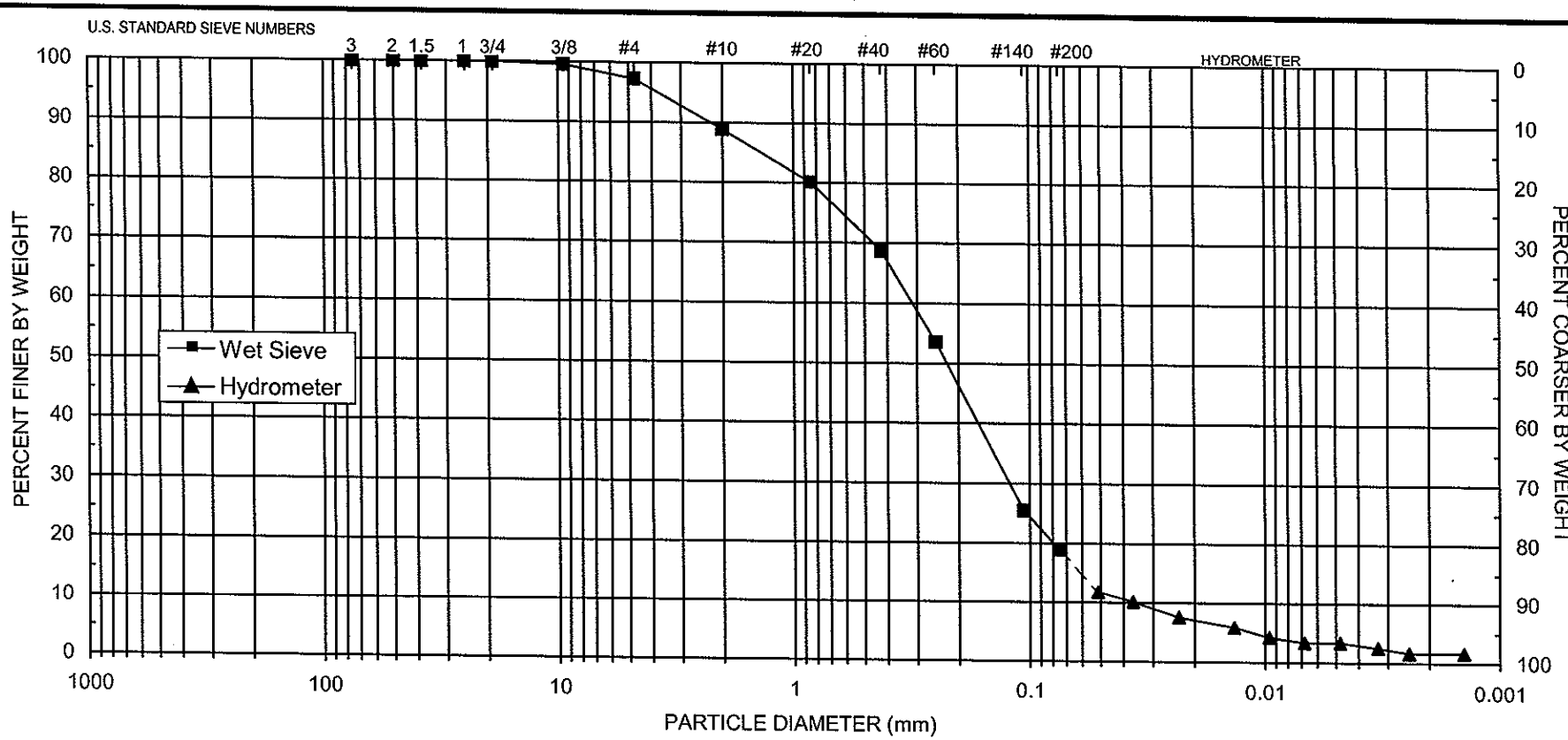
Initial Wt. (g)*:* 52.83
Total Sample Wt. (g)*:* 303.63
Wt. Passing #10 (g): 269.91

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
17-Nov-08	1	19.8	13.0	6.0	7.0	14.2	0.05145	13.3	11.8
	2	19.8	12.0	6.0	6.0	14.3	0.03659	11.4	10.1
	5	19.8	10.5	6.0	4.5	14.6	0.02334	8.5	7.6
	15	19.8	9.5	6.0	3.5	14.7	0.01355	6.6	5.9
	30	19.8	8.5	6.0	2.5	14.9	0.00963	4.7	4.2
	60	19.9	8.0	6.0	2.0	15.0	0.00682	3.8	3.4
	120	20.1	8.0	6.0	2.0	15.0	0.00481	3.8	3.4
	250	20.9	7.5	6.0	1.5	15.1	0.00331	2.8	2.5
	455	21.4	7.0	6.0	1.0	15.2	0.00244	1.9	1.7
18-Nov-08	1395	19.8	7.0	6.0	1.0	15.2	0.00142	1.9	1.7

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.036**	d_{30} = **0.12**	d_{50} = **0.22**	d_{60} = **0.31**	C_u = **8.6**	C_c = **1.3**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-FEP-13A-SG	**136259**	**Silty sand (SM)**		**Sand †**	

† Greater than 10% of sample is coarse material

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13B-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 25-Nov-08

Initial Dry Weight of Sample (g): 353.99
Weight Passing #10 (g): 248.56
Weight Retained #10 (g): 105.43
Weight of Hydrometer Sample (g): 49.51
Calculated Weight of Sieve Sample (g): 70.51

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	353.99	100.00
	2"	50	0.00	0.00	353.99	100.00
	1.5"	38.1	0.00	0.00	353.99	100.00
	1"	25	0.00	0.00	353.99	100.00
	3/4"	19.0	0.00	0.00	353.99	100.00
	3/8"	9.5	7.09	7.09	346.90	98.00
	4	4.75	34.55	41.64	312.35	88.24
	10	2.00	63.79	105.43	248.56	70.22
-10			(Based on calculated sieve wt.)			
	20	0.85	3.22	24.22	46.29	65.65
	40	0.425	4.60	28.82	41.69	59.13
	60	0.250	6.76	35.58	34.93	49.54
	140	0.106	16.85	52.43	18.08	25.64
	200	0.075	3.37	55.80	14.71	20.86
	dry pan		0.39	56.19	14.32	
	wet pan			14.32	0.00	

d_{10} (mm): 0.0095
d_{16} (mm): 0.033
d_{30} (mm): 0.12
d_{50} (mm): 0.26
d_{60} (mm): 0.47
d_{84} (mm): 3.9

Median Particle Diameter --d_{50} (mm): 0.26
Uniformity Coefficient, Cu --$[d_{60}/d_{10}]$ (mm): 49
Coefficient of Curvature, Cc --$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 3.2
Mean Particle Diameter --$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 1.4

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Sandy Loam †

† Greater than 10% of sample is coarse material

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 17-Nov-08
Start Time: 9:30

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

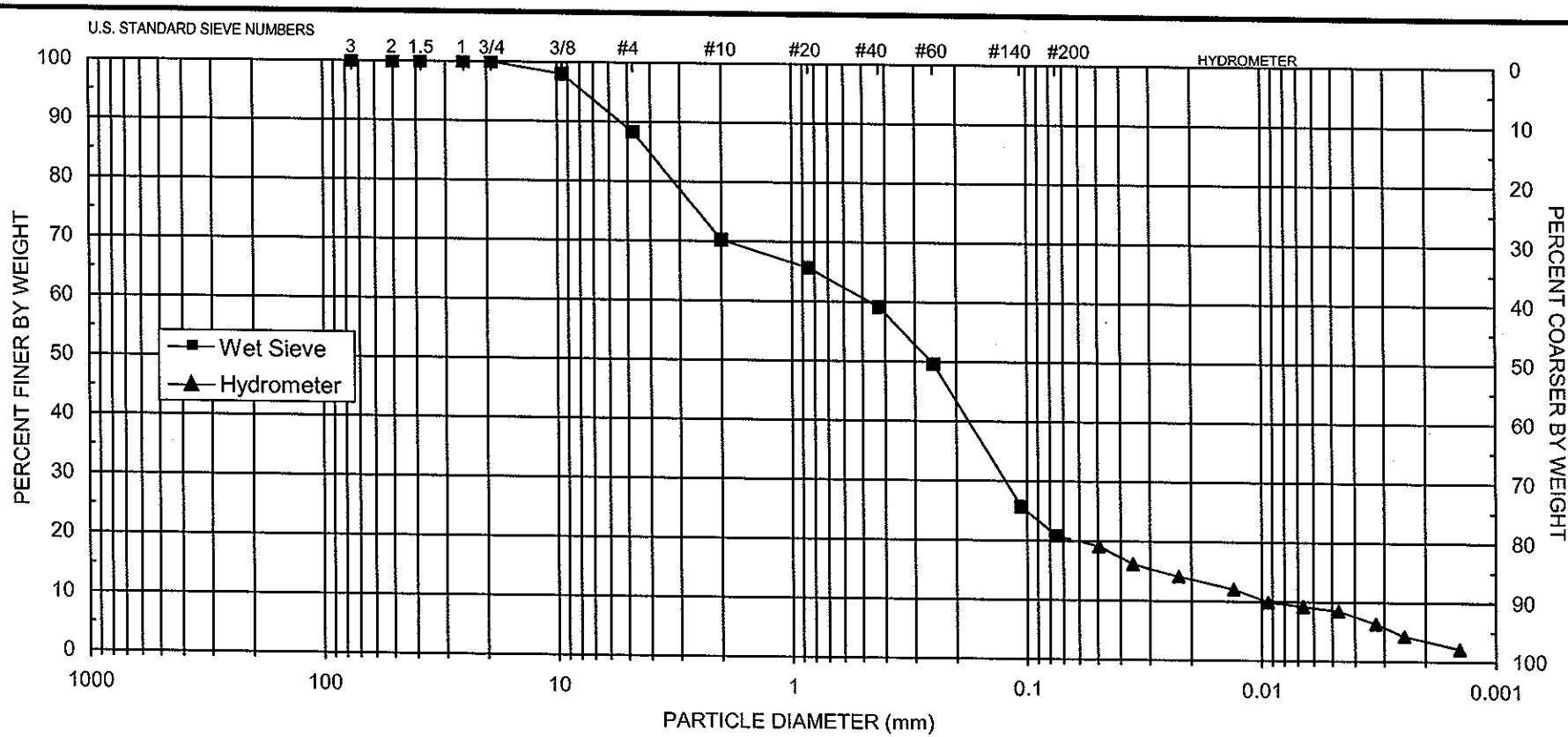
Initial Wt. (g): 49.51
Total Sample Wt. (g): 353.99
Wt. Passing #10 (g): 248.56

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
17-Nov-08	1	19.8	19.5	6.0	13.5	13.1	0.04948	27.3	19.1
	2	19.8	17.5	6.0	11.5	13.4	0.03542	23.2	16.3
	5	19.8	16.0	6.0	10.0	13.7	0.02261	20.2	14.2
	15	19.8	14.5	6.0	8.5	13.9	0.01317	17.2	12.1
	30	19.9	13.0	6.0	7.0	14.2	0.00938	14.1	9.9
	60	20.0	12.5	6.0	6.5	14.3	0.00664	13.1	9.2
	120	20.2	12.0	6.0	6.0	14.3	0.00470	12.1	8.5
	250	20.8	10.5	6.0	4.5	14.6	0.00326	9.1	6.4
	440	21.3	9.0	6.0	3.0	14.8	0.00246	6.1	4.3
18-Nov-08	1380	19.5	8.0	6.5	1.5	15.0	0.00143	3.0	2.1

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.0095**	d_{30} = **0.12**	d_{50} = **0.26**	d_{60} = **0.47**	C_u = **49**	C_c = **3.2**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-FEP-13B-SG	**136259**	**Silty sand (SM)**		**Sandy Loam †**	

† Greater than 10% of sample is coarse material

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15A-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 25-Nov-08

Initial Dry Weight of Sample (g): 552.62
Weight Passing #10 (g): 427.29
Weight Retained #10 (g): 125.33
Weight of Hydrometer Sample (g): 49.61
Calculated Weight of Sieve Sample (g): 64.16

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	552.62	100.00
	2"	50	0.00	0.00	552.62	100.00
	1.5"	38.1	0.00	0.00	552.62	100.00
	1"	25	0.00	0.00	552.62	100.00
	3/4"	19.0	0.00	0.00	552.62	100.00
	3/8"	9.5	21.45	21.45	531.17	96.12
	4	4.75	37.65	59.10	493.52	89.31
	10	2.00	66.23	125.33	427.29	77.32
-10			(Based on calculated sieve wt.)			
	20	0.85	6.93	21.48	42.68	66.52
	40	0.425	10.07	31.55	32.61	50.83
	60	0.250	8.42	39.97	24.19	37.70
	140	0.106	10.75	50.72	13.44	20.95
	200	0.075	1.55	52.27	11.89	18.53
	dry pan		0.23	52.50	11.66	
	wet pan			11.66	0.00	

d_{10} (mm): 0.021
d_{16} (mm): 0.057
d_{30} (mm): 0.17
d_{50} (mm): 0.41
d_{60} (mm): 0.64
d_{84} (mm): 3.2

Median Particle Diameter--d_{50} (mm): 0.41
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 30
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 2.2
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 1.2

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand †

† Greater than 10% of sample is coarse material

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 17-Nov-08
Start Time: 9:00

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

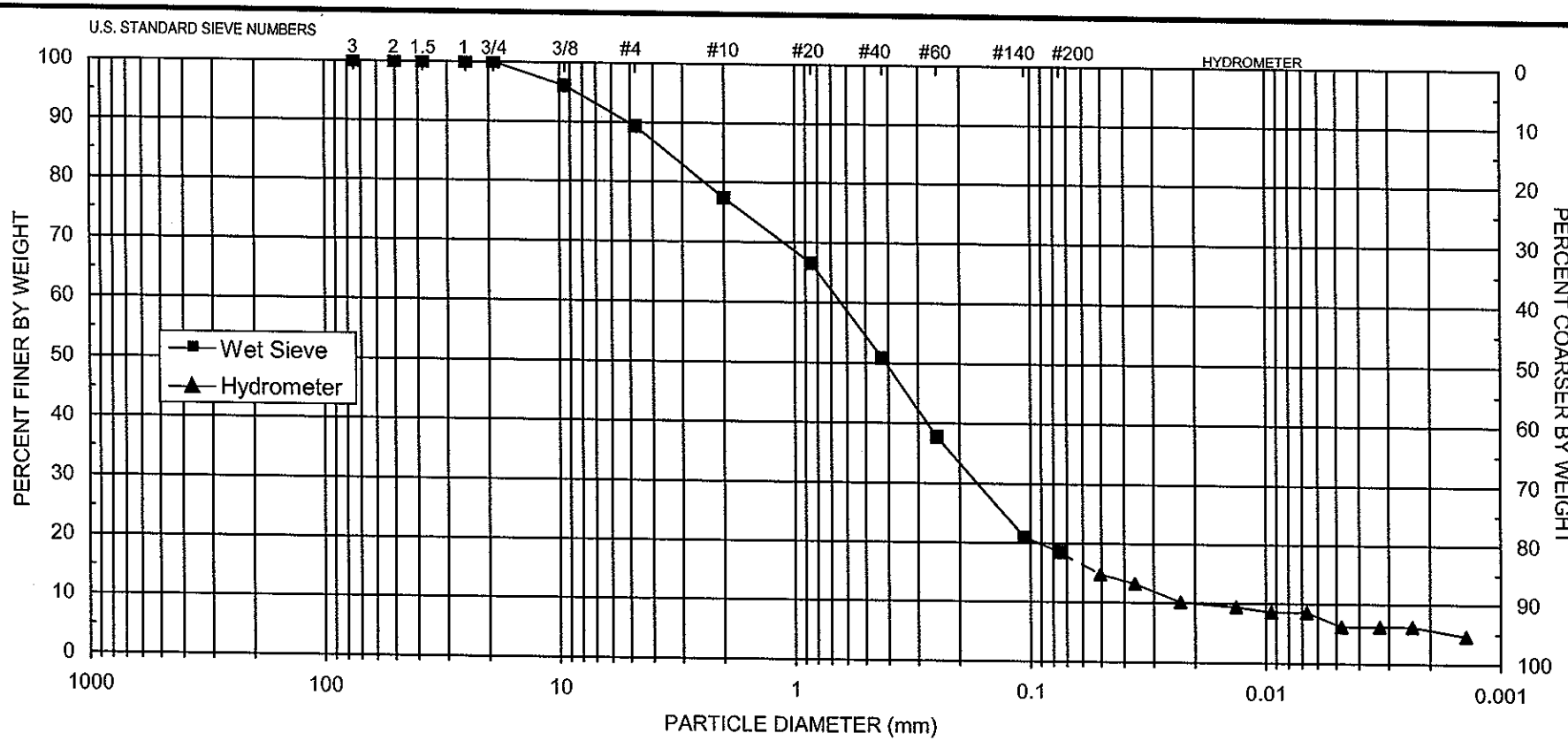
Initial Wt. (g): 49.61
Total Sample Wt. (g): 552.62
Wt. Passing #10 (g): 427.29

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
17-Nov-08	1	19.7	16.0	6.5	9.5	13.7	0.05061	19.1	14.8
	2	19.7	15.0	6.5	8.5	13.8	0.03600	17.1	13.2
	5	19.7	13.0	6.5	6.5	14.2	0.02304	13.1	10.1
	15	19.8	12.0	6.0	6.0	14.3	0.01336	12.1	9.4
	30	19.8	11.5	6.0	5.5	14.4	0.00947	11.1	8.6
	60	19.9	11.5	6.0	5.5	14.4	0.00669	11.1	8.6
	120	20.0	10.0	6.0	4.0	14.7	0.00477	8.1	6.2
	250	20.7	10.0	6.0	4.0	14.7	0.00327	8.1	6.2
	465	21.4	10.0	6.0	4.0	14.7	0.00238	8.1	6.2
18-Nov-08	1405	19.8	9.0	6.0	3.0	14.8	0.00140	6.0	4.7

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.021**	d_{30} = **0.17**	d_{50} = **0.41**	d_{60} = **0.64**	C_u = **30**	C_c = **2.2**
SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION		USDA CLASSIFICATION	
OU4-FEP-15A-SG	**136259**	**Silty sand (SM)**		**Loamy Sand †**	

† Greater than 10% of sample is coarse material

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15B-SG
Project Name: OU4-Phase I
Project Number: 136259
Test Date: 25-Nov-08

Initial Dry Weight of Sample (g): 479.02
Weight Passing #10 (g): 355.82
Weight Retained #10 (g): 123.20
Weight of Hydrometer Sample (g): 51.06
Calculated Weight of Sieve Sample (g): 68.74

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	479.02	100.00
	2"	50	0.00	0.00	479.02	100.00
	1.5"	38.1	0.00	0.00	479.02	100.00
	1"	25	23.82	23.82	455.20	95.03
	3/4"	19.0	0.00	23.82	455.20	95.03
	3/8"	9.5	18.79	42.61	436.41	91.10
	4	4.75	31.42	74.03	404.99	84.55
	10	2.00	49.17	123.20	355.82	74.28
-10			(Based on calculated sieve wt.)			
	20	0.85	10.36	28.04	40.70	59.21
	40	0.425	8.72	36.76	31.98	46.52
	60	0.250	6.51	43.27	25.47	37.05
	140	0.106	8.71	51.98	16.76	24.38
	200	0.075	2.68	54.66	14.08	20.48
	dry pan		0.36	55.02	13.72	
	wet pan			13.72	0.00	

d_{10} (mm): 0.022
d_{16} (mm): 0.056
d_{30} (mm): 0.16
d_{50} (mm): 0.51
d_{60} (mm): 0.89
d_{84} (mm): 4.5

Median Particle Diameter--d_{50} (mm): 0.51
Uniformity Coefficient, Cu--$[d_{60}/d_{10}]$ (mm): 40
Coefficient of Curvature, Cc--$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 1.3
Mean Particle Diameter--$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 1.7

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand with gravel (SM)g
USDA Soil Classification: Loamy Sand †

† Greater than 10% of sample is coarse material

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines

Particle Size Analysis
Hydrometer Data

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 17-Nov-08
Start Time: 9:06

Type of Water Used: DISTILLED
Reaction with H_2O_2: NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

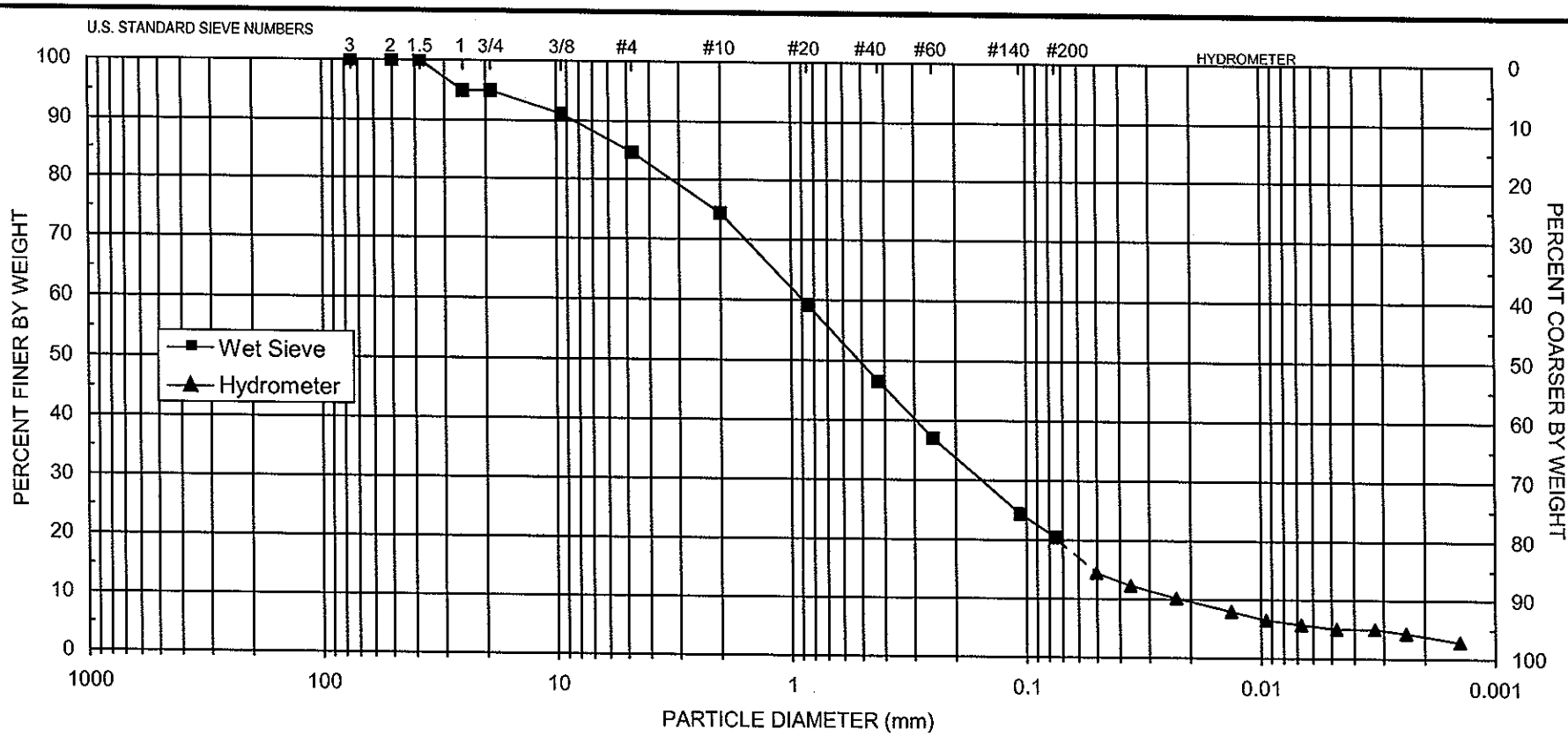
Initial Wt. (g): 51.06
Total Sample Wt. (g): 479.02
Wt. Passing #10 (g): 355.82

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
17-Nov-08	1	19.7	16.5	6.5	10.0	13.6	0.05046	19.6	14.5
	2	19.8	14.5	6.0	8.5	13.9	0.03606	16.6	12.4
	5	19.8	13.0	6.0	7.0	14.2	0.02301	13.7	10.2
	15	19.8	11.5	6.0	5.5	14.4	0.01340	10.8	8.0
	30	19.8	10.5	6.0	4.5	14.6	0.00953	8.8	6.5
	60	19.9	10.0	6.0	4.0	14.7	0.00675	7.8	5.8
	120	20.1	9.5	6.0	3.5	14.7	0.00477	6.9	5.1
	250	20.8	9.5	6.0	3.5	14.7	0.00328	6.9	5.1
	460	21.4	9.0	6.0	3.0	14.8	0.00240	5.9	4.4
18-Nov-08	1400	19.8	8.0	6.0	2.0	15.0	0.00141	3.9	2.9

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: K. Wright
Data entered by: C. Krous
Checked by: J. Hines



UNIFIED	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		Coarse	Fine	Coarse	Medium	Fine				
USDA	COBBLES	GRAVEL		SAND				SILT	CLAY	
				Very coarse	Coarse	Medium	Fine	Very fine		

d_{10} = **0.022**	d_{30} = **0.16**	d_{50} = **0.51**	d_{60} = **0.89**	C_u = **40**	C_c = **1.3**

SAMPLE NUMBER	PROJECT NUMBER	ASTM CLASSIFICATION	USDA CLASSIFICATION
OU4-FEP-15B-SG	**136259**	**Silty sand with gravel (SM)g**	**Loamy Sand †**

† Greater than 10% of sample is coarse material

Atterberg Limits/ Identification of Fines

Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
OU4-LEP-10A-SG	50	18	32	CH
OU4-LEP-10B-SG	27	15	12	CL
OU4-FEP-13A-SG	---	---	---	ML
OU4-FEP-13B-SG	---	---	---	ML
OU4-FEP-15A-SG	---	---	---	ML
OU4-FEP-15B-SG	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Dec-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:	34	26	17
Pan number:	LL1	LL2	LL3
Weight of pan plus moist soil (g):	124.03	122.32	128.27
Weight of pan plus dry soil (g)	122.27	120.66	124.40
Weight of pan (g):	118.62	117.36	116.97
Gravimetric moisture content (% g/g):	48.22	50.30	52.09
Liquid Limit:	50		

Plastic Limit

	Trial 1	Trial 2
Pan number:	PL1	PL2
Weight of pan plus moist soil (g):	114.93	120.29
Weight of pan plus dry soil (g)	114.51	119.96
Weight of pan (g):	112.15	118.16
Gravimetric moisture content (% g/g):	17.80	18.33
Plastic Limit:	18	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: 50
Plastic Limit: 18
Plasticity Index: 32

Classification: CH

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-LEP-10B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 31-Dec-09

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:	38	30	14
Pan number:	LL1	LL2	LL3
Weight of pan plus moist soil (g):	125.91	126.22	129.68
Weight of pan plus dry soil (g)	124.35	124.46	127.01
Weight of pan (g):	118.36	117.98	117.87
Gravimetric moisture content (% g/g):	26.04	27.16	29.21
Liquid Limit:	27		

Plastic Limit

	Trial 1	Trial 2
Pan number:	PL1	PL2
Weight of pan plus moist soil (g):	120.69	115.52
Weight of pan plus dry soil (g)	120.26	115.13
Weight of pan (g):	117.47	112.61
Gravimetric moisture content (% g/g):	15.41	15.48
Plastic Limit:	15	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: 27
Plastic Limit: 15
Plasticity Index: 12

Classification: CL

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Dec-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Classification (Visual Method): ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Data for Description and Identification of Fines
(Visual-Manual Procedure)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Dec-08

Visual-manual classification of material passing the #40 sieve in lieu of Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Dark Yellowish Brown (10YR 4/4)
Odor: None
Moisture Condition: Moist
HCl Reaction: None

Preliminary Identification:

Dry Strength: Low
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Dec-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Classification (Visual Method): ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Data for Description and Identification of Fines
(Visual-Manual Procedure)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-13B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Dec-08

Visual-manual classification of material passing the #40 sieve in lieu of Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Dark Yellowish Brown (10YR 4/4)
Odor: None
Moisture Condition: Moist
HCl Reaction: None

Preliminary Identification:

Dry Strength: Low
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Dec-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Classification (Visual Method): ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Data for Description and Identification of Fines
(Visual-Manual Procedure)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15A-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Dec-08

Visual-manual classification of material passing the #40 sieve in lieu of Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Light Olive Brown (2.5Y 5/4)
Odor: None
Moisture Condition: Moist
HCl Reaction: None

Preliminary Identification:

Dry Strength: Medium
Dilatency: Slow
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Atterberg Limits

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Dec-08

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Classification (Visual Method): ML

Comments:

--- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Data for Description and Identification of Fines
(Visual-Manual Procedure)

Job Name: Brown and Caldwell
Job Number: LB08.0201.00
Sample Number: OU4-FEP-15B-SG
Project Name: OU4-Phase I
Project Number: 136259

Test Date: 2-Dec-08

Visual-manual classification of material passing the #40 sieve in lieu of Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Dark Yellowish Brown (10YR 4/4)
Odor: None
Moisture Condition: Moist
HCl Reaction: None

Preliminary Identification:

Dry Strength: Low
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Laboratory Tests and Methods

Tests and Methods

Dry Bulk Density:	ASTM D6836
Moisture Content:	ASTM D2216; ASTM D6836
Calculated Porosity:	ASTM D6836
Saturated Hydraulic Conductivity:	
Constant Head: (Rigid Wall)	ASTM D 2434 (modified apparatus)
Falling Head: (Rigid Wall)	Klute, A. and C. Dirkson. 1986. Hydraulic Conductivity and Diffusivity: Laboratory Methods.Chp. 28, pp. 200-203, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Hanging Column Method:	ASTM D6836; Klute, A. 1986. Porosity. Chp.26, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Pressure Plate Method:	ASTM D6836; ASTM D2325
Water Potential (Dewpoint Potentiometer) Method:	ASTM D6836; Rawlins, S.L. and G.S. Campbell, 1986. Water Potential: Thermocouple Psychrometry. Chp. 24, pp. 597-619, in A. Klute (ed.), Methods of Soil Analysis, Part 1. American Society of Agronomy, Madison, WI.
Relative Humidity (Box) Method:	Karathanasis & Hajek. 1982. Quantitative Evaluation of Water Adsorption on Soil Clays.SSA Journal 46:1321-1325; Campbell, G. and G. Gee. 1986. Water Potential: Miscellaneous Methods.Chp. 25, pp. 631-632, in A. Klute (ed.), Methods of Soil Analysis, American Society of Agronomy, Madison, WI
Moisture Retention Characteristics & Calculated Unsaturated Hydraulic Conductivity:	ASTM D6836; van Genuchten, M.T. 1980. A closed-form equation for predicting the hydraulic conductivity of unsaturated soils. SSSAJ 44:892-898; van Genuchten, M.T., F.J. Leij, and S.R. Yates. 1991. The RETC code for quantifying the hydraulic functions of unsaturated soils. Robert S. Kerr Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Ada, Oklahoma. EPA/600/2091/065. December 1991
Particle Size Analysis:	ASTM D422
Atterberg Limits:	ASTM D4318
Visual-Manual Description:	ASTM D2488